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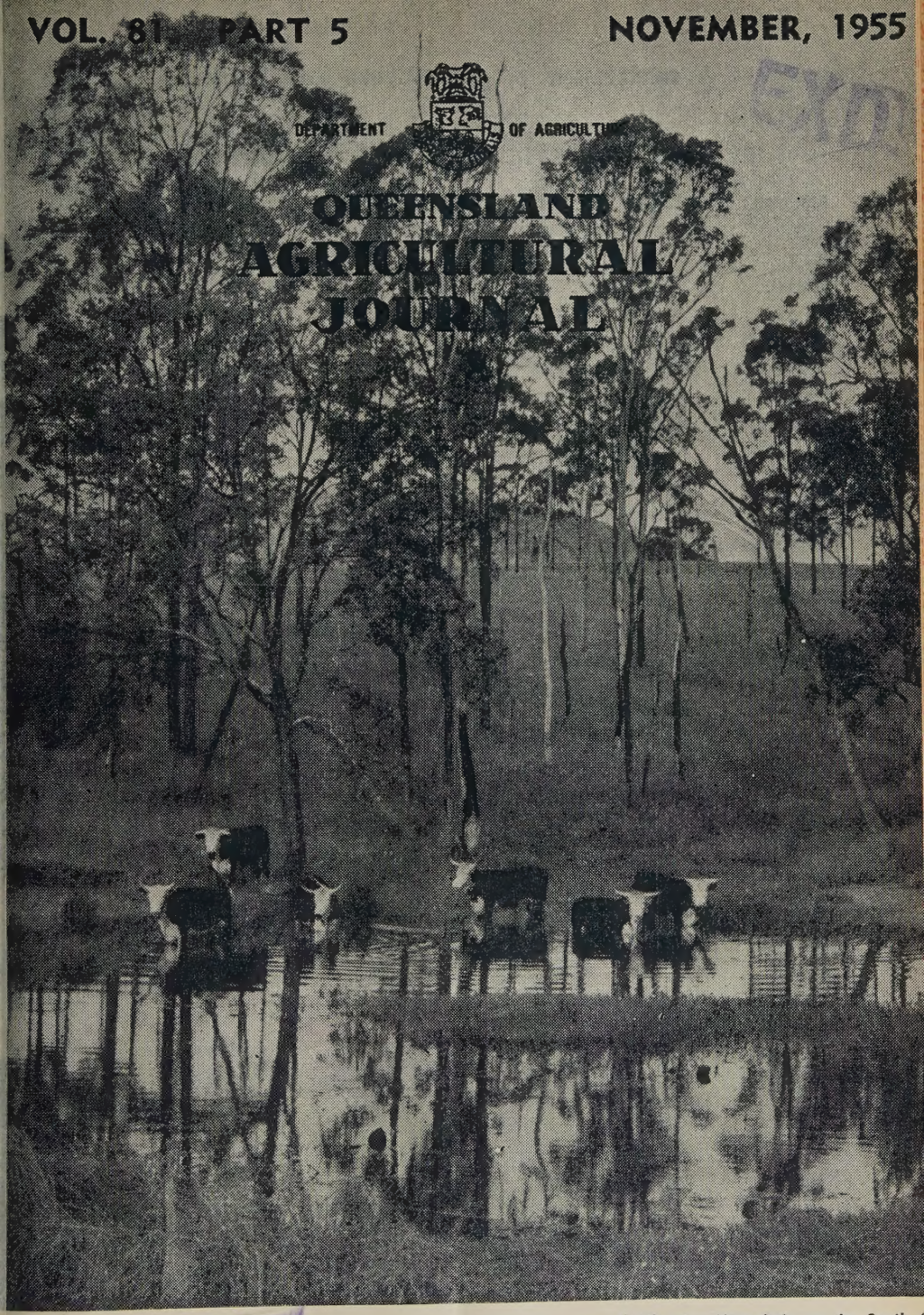

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Grosse Lisse Tomato
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A Hoist for Calves

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	Reushle Bros., "Reubydale" Stud, Ravensbourne
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	E. Evans, Wootha, Maleny
	T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
	J. Crookey, "Arolla A.I.S. Stud" Fairview, Allora
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	A. H. Webster, "Millievale," Derrymore
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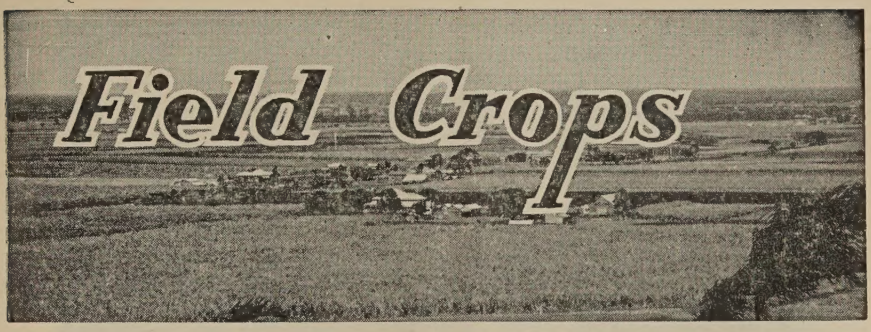

Maize Investigations at the Ayr Regional Experiment Station.

By R. J. NORMAN, Field Assistant.

The Ayr Regional Experiment Station was established in 1948 for the primary purpose of studying the range of crops and pastures that could possibly be grown commercially in the Lower Burdekin area. An indication of this range, together with a brief summary of the results, were given in the March, 1954, issue of the *Queensland Agricultural Journal,* and this report is presented to provide details of results so far obtained in the maize investigations.

Fundamental knowledge concerning the growth of the maize plant in this district was primarily needed so that a proper evaluation of the suitability of this crop could be made. For this reason it was found necessary to investigate the best time of the year in which to plant, the varieties or hybrids most suited to the Burdekin area, the type and amount of fertilizer required to obtain the most economical yields, the times at which the fertilizer should be applied, and finally, the best methods and times of applying supplementary irrigations to obtain good commercial yields.

TIME OF PLANTING.

As the usual time to plant maize on the Atherton Tableland is after storm rains but just prior to the main wet season, the first varietal trial at Ayr Regional Experiment Station was planted on January 13, 1950. The yields obtained from this trial were very disappointing. Diseases of both leaves and cobs were prevalent, and most of the crop lodged. Pollination was very poor, resulting in many cobs carrying very few grains.

Lack of sunlight over long periods could have been the chief cause of the failure of this trial. As many of the days during the normal wet season have very little sunshine, the planting of maize during this period has been discontinued. Also, any fertilizers applied to a crop would be quickly leached out, as studies have shown that rain falling during the wet season penetrates to the gravel beds beneath the root zone of the plants.

Trials were next planted immediately after the wet season and have up to the present given promising results, yields up to 120 bus. of shelled grain per acre having been obtained. (See Plate 1.) This planting has the advantage that few irrigations are needed during the growing period, as the plants utilise the moisture stored in the soil. Also, during the first three to six weeks after planting occasional falls of rain can normally be expected in sufficient amounts to supply the needs of the young plants. The number of irrigations needed by the crop will, of course, depend on

Plate 1.

Well-grown Maize in a Fertilizer Trial, Ayr Regional Experiment Station.
Planted 4/3/53. Average yield 110 bus. per acre.

the rainfall received and the temperatures throughout the growing period.

The third time of planting that has been tested is an early spring planting. Results obtained have also shown promise, an average yield of approximately 70 bus. per acre having been obtained. This planting is usually carried out in late July and early August to allow the crop to mature before the onset of the wet season. Because very little rainfall is received during the growth of this crop, supplementary irrigations have to be given frequently to provide the moisture requirements of the plants.

CULTIVATION OF THE MAIZE CROP.

As for most crops, careful preparation of the land for maize is important. As the preparation of the land for the autumn and August plantings differs, it is proposed to deal with them separately.

Autumn Planting.

Preparation for the autumn planting should begin before the wet season, the land being ploughed and let lie in the rough state. If at all possible, weed and grass growth on the area should be checked by cultivation during any dry periods that occur in the wet season. If this cannot be done and weed growth becomes very prolific, the area should be mown and the weeds raked off as soon as possible after the main wet season. If they are ploughed in, the resultant lock-up of nitrate-nitrogen will cause a considerable reduction in yield. In one trial at the Regional Experiment Station, there was an average of 30 bus. per acre less grain produced on the

land that had not been ploughed before the wet season although the whole area had otherwise received identical preparation for planting.

When it has not been possible to check the weed growth during the wet season, the land should be ploughed before planting. The soil should be worked into a suitable seedbed as soon as possible to enable the planting to be done before the surface dries sufficiently to make it necessary to give a pre-planting irrigation to promote germination of the maize.

August Planting.

Preparation of the land for the August planting is fairly straightforward. In most cases ploughing is done soon after the wet season and the land is let lie in the rough state until the final preparation of the seedbed begins. Weeds should be kept in check to save the moisture stored in the soil from the wet season. For the final preparation for planting, the land can be ploughed and tandem disced. A light irrigation followed by a cultivation will generally be found necessary to provide suitable conditions for germination of the seed.

The maize can be planted with any type of planter equipped for sowing large grain. It has been found, however, that a split-wheel planter which has a fertilizer attachment gives very good results. It must be remembered that good stands are essential for good yields. (See Plate 2.)

A plant spacing giving satisfactory results in several seasons on this Regional Experiment Station has been a single plant every 12 in. in rows spaced 42 in. apart. To further increase the plant population per acre, inter-row spacings of 3 ft. have been used in some trials. However, it is most important to remember that if the plant population per acre is increased on infertile soils, it will be necessary to increase the amount of fertilizer applied per acre. The water requirements of a large population of plants will also be correspondingly greater, and unless this increased demand is met, yields will be reduced.

If sufficient misses occur in the stand of seedlings to make it necessary to fill the gaps, then this operation should be carried out as soon as possible. Replants that emerge when the surrounding plants are too high will be

Plate 2.

Satisfactory Stand of Young Maize in 42-Inch Rows.

seriously affected by shade and competition and generally fail to set full cobs.

Various trials have shown the necessity of nitrogenous fertilizers for maize growing on the sandy loams and silt loams of this Experiment Station which are typical of large areas of the Lower Burdekin district. These fertilizers have been applied at various stages of growth of the plants.

Planting and fertilizing can be done in the one operation with planters that have a fertilizer attachment. When the maize is 10-15 in. high, a further fertilizer application can be given while cultivating and hilling the crop. Generally speaking, the second application of fertilizer is placed on both sides of the maize row about four inches from the plants. A hilling attachment then throws the soil and the fertilizer towards the plants. As the fertilizer is covered by the hills, it cannot readily be dissolved and washed away by rains and irrigations. The hills also help to support the maize plants and to allow the use of furrow irrigation.

IRRIGATIONS.

During all maize trials conducted on the Station, a record has been kept of all rainfall received and irrigations given during the growing period. It has been found that if the maize is allowed to show any sign of stress through lack of moisture, the yields will be substantially reduced. This reduction in yield is very marked if the stress period occurs either just before or during the tasselling stage.

The amount of moisture required by the crop during the growing period depends on the prevailing climatic conditions and the time of planting. As the autumn and August plantings require different amounts of irrigation, it is proposed to deal with them separately.

One of the local difficulties experienced in the trials has been to get sufficient penetration of water through the surface silt loams to the lower soils. Consequently, it is not uncommon to find that the soil below the level of irrigation water penetration progressively approaches wilting point as the crop matures. Data obtained from a maize area on the Experiment Station illustrate the slow rate of infiltration in an old cultivation:—

Amount of water absorbed per acre after—

- ½ hour of application—1·2 acre inches.
- 1 hour of application—1·4 acre inches.
- 1·5 hours of application—1·7 acre inches.
- 2 hours of application—2·0 acre inches.
- 3 hours of application—2·3 acre inches.

The infiltration rate is somewhat higher on the levee bank lighter soils further up the Burdekin River, and this should make irrigation of the crop there less difficult. On the Delta soils especially, inter-row cultivation after rainfall or irrigation will help to keep the soil in a more receptive condition for further rains or irrigations.

The number of irrigations given to the August-planted crop will depend on the climatic conditions experienced and the permeability of the soil. Usually five or six irrigations are necessary, but a soil with a good infiltration rate would need fewer but heavier waterings.

The main point to remember is that the maize plant can grow rapidly in this climate, a height increase of four inches per day having often been noted. This rapid growth places a big demand on the moisture stored in the soil, especially with a good stand of plants in rows spaced 3 ft. apart. Consequently, on soils of low permeability it may be necessary to water weekly while stress conditions prevail.

It is very important that the autumn crop be planted as early as

possible after the wet season to eliminate the necessity of early irrigations. An early-planted crop with a favourable season could require no more than two irrigations. If for some reason planting is delayed in a dry autumn, a light irrigation may be necessary to obtain a good germination of the seed.

No matter when the maize is planted, an adequate supply of moisture is essential at all stages of the growth of the crop. It is a waste of time and money to get a good stand and to apply fertilizer at a heavy rate if the crop does not receive sufficient moisture. Every time the maize plant shows signs of stress from lack of moisture, yields are reduced.

VARIETY TESTING.

Because of the two planting periods involved, trials are being conducted to find the best varieties and hybrids most suited for each one. A high-yielding variety with a medium time to maturity is required for the autumn planting, while the August planting should be of a quick-maturing type that will ripen the grain before the onset of the wet season. Both plantings demand a variety which will not lodge and will respond readily to applications of necessary fertilizers.

Numerous varieties and hybrids have been tested at the Station during the past five years. During this period, the hybrids have outyielded open-pollinated varieties in all trials, the average difference between the mean yields of each type in all varietal trials being 18 bus. per acre.

Both Queensland and New South Wales hybrids have been tested, but the latter only to a limited extent. The N.S.W. hybrids, which were earlier maturing than the Queensland hybrids, performed fairly well in an autumn planting but did not yield as well as the Queensland hybrids in a spring planting. Queensland hybrids Q719 and Q724 have yielded consistently well.

FERTILIZER TESTING.

Because of the leaching effect of the monsoonal rains, experiments have been conducted to determine the type of fertilizer to be used, the amounts of fertilizer to apply and the correct times at which to apply them. Results so far obtained have shown that in plantings after the wet season, quickly soluble nitrogenous fertilizers are necessary for the production of good yields of maize. In one trial the application of 2 cwt. of sulphate of ammonia per acre when the plants were 12 in. tall increased the yield by over 30 bus. per acre.

Trials using sulphate of ammonia at different rates of application and applied at different stages of growth have been and are being carried out to obtain the most economical yields. The times at which the fertilizer has been applied are (1) at planting time, (2) when the plants are 12-15 in. high, and (3) when the maize is at the pre-tasselling stage.

The first application is usually applied at the same time as planting. In all experiments carried out at Ayr, this has been a mixed fertilizer 10.0-8.25-7.5 N.P.K. applied at a rate of 1 to 2 cwt. per acre.

The second application when the plants are 12-15 in. tall is a booster application of sulphate of ammonia to provide the nitrate-nitrogen requirements of the crop until maturity.

Where the second application has been insufficient, a further application can be given when the plants are at the pre-tasselling stage. It is important that the crop has sufficient nitrate-nitrogen at tasselling, as not only are the yields affected but the protein value of the grain is also influenced.

The methods of applying the first two fertilizer treatments have already been dealt with. The pre-tasselling application generally has to be done by hand. An alternative method is to

apply the fertilizer in the irrigation water. Although this has not been done at the Ayr Regional Experiment Station, a fair distribution could be obtained by dissolving the fertilizer in the water as it leaves the head ditch. The fertilizer should not be applied until the flow of water already released has reached about two-thirds of the distance down the rows.

Although good yields have been obtained, further improvements by fertilizing practices may be anticipated. However, a combination of a mixed fertilizer (10.0-8. 25-7.5) applied at the rate of 180 lb. per acre at planting time, followed by a side dressing of 2 cwt. per acre of sulphate of ammonia when the plants are 12-15 in. tall, has given substantial economical gains over non-fertilized maize.

SUMMARY.

The autumn crop should be planted as soon as possible after the wet season to make full use of any late rains that may occur. This rainfall, plus the moisture retained in the soil, will reduce the number of irrigations required to supply the water needs of the crop. However, it is stressed that the full moisture requirements of the crop must be met, and unless this is done yields will be adversely affected.

The spring planting should be done in late July or early August so as to allow the grain to ripen before the wet season.

Suitable hybrids from which good yields have been obtained are Q 719 and Q 724. Other hybrids have given good results, but have not yet been fully tested.

A provisional recommendation for fertilizing is 180 lb. per acre of mixed fertilizer (10.0-8.25-7.5) at planting time followed by a side dressing of 2 cwt. per acre of sulphate of ammonia applied when the plants are 12-15 in. tall.

Provided a good stand has been obtained, sufficient moisture is available to the crop throughout its growth and the fertilizer requirements are met, yields of over 75 bushels of grain per acre can be confidently expected.

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Tobacco Growing in the Mareeba—Dimbulah Area.

By E. W. BAIRD, Senior Adviser in Agriculture.

Tobacco has been grown commercially in North Queensland since 1930, after exploratory plots had demonstrated that the crop could be grown satisfactorily on many types of soil which have a predominantly sandy character. These plots ranged from south of Mackay to Mareeba and Dimbulah, and even to Chillagoe and Mt. Garnet.

From this time onward, as experience has been gained, it has been shown that the plant will grow on many other soil types but that the characteristics of aroma and texture will vary greatly from one soil type to another.

The trend of public taste has been away from the heavier types of pipe tobacco towards the lighter cigarette type of leaf, and it is this latter type which has been predominantly grown in the area.

In the early days of tobacco production, the entire crop was grown on natural rainfall. This method proved hazardous owing to the vagaries of temperature and rainfall, with the result that stability has been sought by the use of irrigation. The first North Queensland area to use irrigation for tobacco culture was Emerald Creek. The practice gradually spread along the banks of the Barron and Walsh Rivers and their tributaries, such as Granite, Eureka and Leadingham Creeks, till at present over three-quarters of the entire crop is grown under irrigation.

The water for irrigation is being drawn from weirs which are situated on the main streams. From time to time, supplies are released from these storages for use by growers downstream from them.

Large irrigation works are now being constructed to supply areas away from the main streams, which would be otherwise dry. Water is to be supplied from these storages by channels which will reticulate it to an estimated total of 38,000 acres and 1,180 tobacco farms. The main storage is to be the Tinaroo Falls Dam on the Barron River. This will hold 320,000 acre feet of water and will inundate 10,000 acres of land.

Existing storages and their capacities are as follows:—

Weir	Storage. Acre ft.
Emerald Creek	44
Granite Weir (Granite Creek)	146
Dulbil Weir (Tinaroo Creek)	220
Leafgold Weir (Walsh River)	320
Bruce Weir (Walsh River) ..	790
Collins Weir (Walsh River) ..	800
Solanum Weir (Eureka Creek)	280

The area devoted to tobacco has fluctuated from year to year but the average has been in the vicinity of 2,000 acres.

The land tenure is, in the main, perpetual lease, with the majority of owners producing a crop. Most of these owner-growers have one or two share-farmers, the usual area grown by each being five to six acres.

TABLE 1.

Details of Tobacco Leaf Production from the Mareeba-Dimbulah District over an 8-Year Period.

Season.	Acreage.	Total Yield.	Yield Per Acre.
		Lb.	Lb.
1946–47	1,367	1,036,560	758
1947–48	1,233	1,089,312	883
1948–49	1,015	916,160	903
1949–50	1,713	1,530,189	893
1950–51	2,418	1,350,980	559
1951–52	2,865	2,165,038	756
1952–53	2,632	1,830,498	695
1953–54	2,289	1,986,809	868

Source :—Government Statistician.

Plate 1.

Map of the Mareeba–Dimbulah District Showing Principal Features. Sites of present weirs are shown. The area outlined in this map represents the approximate area to be served by irrigation schemes now in process of development.

CLIMATE.

The Mareeba-Dimbulah area has an annual rainfall of from 27 to 35 in., of which the greater part falls during the December-March period.

In a summer season in which rainfall is well distributed, and temperatures and weather conditions generally are favourable, excellent leaf can be produced under natural rainfall.

Plate 2.

The Bruce Weir on the Walsh River near Dimbulah. This weir impounds 790 acre feet of water for irrigation purposes.

However, such seasons have proved to be rare. Uncertain rains early in the season make establishment difficult, and subsequent heatwaves may seriously reduce the crop prospects. In addition, in some years, prolonged mid-season rains accompanied by lowered temperatures may favour the outbreak of disease.

TABLE 2.

AVERAGE MONTHLY RAINFALL FIGURES IN INCHES FOR MAREEBA AND DIMBULAH

Month.	Mareeba. Mean of 23 Years.	Dimbulah. Mean of 15 Years.
January ..	7·82	5·78
February ..	10·39	8·75
March ..	6·43	4·31
April ..	1·51	1·27
May	0·58	0·41
June ..	0·76	0·59
July	0·34	0·36
August ..	0·28	0·09
September ..	0·24	0·19
October ..	0·60	0·63
November ..	1·78	1·88
December ..	4·07	3·19
Total ...	34·80	27·45

Where irrigation is available, the crop can be grown prior to the wet season. Provided ample water is available, the plants normally make excellent growth during the warm spring weather and the crop is not subject to excessive moisture or to drought.

On irrigation farms, the planting is best carried out during September and October, when conditions are most suitable for the establishment of the crop. Harvesting such crops is normally finalised before the onset of the wet season.

With rain-grown crops, planting out commences when the field moisture is sufficient to sustain the growth of the transplanted seedlings. This is usually after storms in the December-January period.

SOILS AND VEGETATION.

The original open-forest vegetation on the areas in use for tobacco production consisted largely of grey box, bloodwood, ironwood and poplar gum. The natural grass cover was composed of erect tussocky grasses which were, however, softer and more palatable than the spear grasses which have largely taken their place. Regular firing of the grassland has contributed largely to this change.

Soil types vary considerably throughout the area, but a number of the types available are suitable for tobacco growing provided due attention is paid to drainage and correct fertilizer practices. Apart from the river and creek alluvials, most of these soils show a close relationship with the underlying parent rock.

The alluvials are widespread but occur mainly in small patches. They have been extensively cropped in recent years because of their suitability for irrigation and their proximity to the water supplies. They are mainly brownish sands, sandy loams and loams with a surface depth of 6-18 in.

Soils derived from fine-grained schist rock occur in the Tinaroo, Levison, Emerald and Shanty Creek areas, and west of Biboohra; also in the Leadingham Creek watershed. These soils are grey and grey-brown fine sands and sandy loams with yellow or grey-brown subsoils of light texture overlying clay. They vary considerably in depth, and only the deeper types are suitable for tobacco growing.

A major soil group in the Mareeba-Dimbulah area comprises those soils derived from coarse-grained granites and associated conglomerate rocks. The majority of these soils are light-

Plate 3.

Tobacco Growing on a Barron River Alluvial Soil near Mareeba. This soil is a coarse-grained sandy loam, well suited for tobacco growing with furrow irrigation.

coloured grey-white and grey-brown gritty sands and sandy loams; on some of the more elevated ridges the colour tends more to brown and red-brown. Many of the soils of this group are very well suited for tobacco growing. As much of this country is elevated, however, it cannot at present be commanded by irrigation. Some of the best examples of these granitic soils are in the neighbourhood of Paddy's Green, west and south-west of Dimbulah, and along the Walsh River and Sandy and Eureka Creeks.

The fourth important soil type of the area is that of the basaltic red loams which cover a considerable area, on both sides of the road, between Mareeba and Rocky Creek. Some of these soils carry heavy basalt boulders. This type generally, however, is the most fertile soil in the district, and produces good rain-grown crops of peanuts, maize and cowpeas. It has been used to a limited extent for tobacco, but requires careful handling for that purpose.

Other soil types occur in the district, but they are of little significance for tobacco growing.

It has been generally found that the brown and grey granitic sandy loams, which characterise much of the Dimbulah area, produce the most uniformly high quality leaf. Such leaf is of very bright colour and good aroma and elasticity. Leaf from the red, brown and grey sandy loams of the Emerald Creek and Barron River areas is normally slightly heavier bodied, but with quite good colour and texture.

There has been a recent tendency to produce greater amounts of leaf on the basaltic clay loams. Soils of this type, however, should not be used by inexperienced growers, as unless skilfully handled they may produce leaf of heavy body and poor aroma. The heavier soils, including the red loams and some of the alluvial flats, generally tend to produce leaf which is darker in colour, heavier in texture, and with an unpleasant aroma.

DRAINAGE.

The necessity for a tobacco soil to possess good drainage cannot be too strongly stressed. In fact, so essential is this requirement that a soil of doubtful drainage should be entirely avoided. Under poorly drained conditions the plant is subject to water-logging and to disease attack. Even if such conditions do not entirely kill the plant, they result in the production of very poor quality leaf.

The drainage of land may generally be diagnosed correctly by an inspection of the type of vegetation growing upon it. The presence of tea-tree, poplar gum and certain sedges is generally indicative of wet soil and subsoil conditions during periods of sustained rainfall. Some of these soils, however, can be used for crop production provided all the moisture requirements of the crop are supplied by controlled irrigation.

Well-drained land of the better class is usually associated with bloodwood. Narrow-leaf ironbark is commonly associated with well-drained gravel ridges, and grey box generally denotes shallow clay soils suitable for use under irrigation only.

Where crops are to be grown under rainfall conditions and the drainage is poor, artificial drains should be constructed on the contour to carry off excess water during the wet season. If, on the other hand, such rain-grown crops are produced on sloping soils, it is advisable to plant on the contour, using banks and drills with a grade of no more than 4 in. to the chain.

PREPARATION OF LAND FOR PLANTING.

Where it is desired to bring virgin land into production it is the practice to clear the timber by the use of

Plate 4.

Early Preparation of Land for Tobacco Growing. This pasture is being ploughed under in midsummer in preparation for next season's tobacco crop. Grass is an almost essential stage in any long-term tobacco rotation in North Queensland.

bulldozers, tree-pullers or pulleys. If possible, this is carried out during (or at the end of) the wet season, when good soil moisture allows ease of operation.

As soon as the land has been cleared, and the timber cut for firewood, the first ploughing should take place. This should be only deep enough to turn under the grass and break the top layer of soil. Early ploughing is necessary, otherwise an uneven crop will result.

Further ploughings are given throughout the winter and spring months to aerate the soil, trap rainfall, and kill grass or weed growth. These ploughings should be as deep as possible without bringing up the subsoil, but the number of ploughings should be kept to a minimum.

On old tobacco land also, early ploughing is essential for the control of weed growth. Prior to planting, the land is harrowed and brought to a fine tilth.

For Furrow Irrigation.

If gently sloping even land is to be used for furrow irrigation, local variations in level may be smoothed out by the use of a home-made smoother. This consists of long runners connected by cross-pieces. When the smoother is pulled over the prepared land, its cross-pieces collect soil from the high spots and deposit it in the low areas. Details of construction of this implement are outlined in a separate publication which may be obtained on application to the Department of Agriculture and Stock.

Where larger falls and depressions exist, a grader or land-leveller must be used. Care must be taken to avoid removing too much soil by these larger machines, as plant growth may be seriously depressed by so doing.

If land intended for furrow irrigation is more sloping or irregular, consideration must be given to the use of contour furrows for irrigation. These are furrows which are surveyed to follow close to the natural contours of the land, but having a regular slight fall from one end to the other.

The initial watering furrows are placed 4 ft. apart, though some variation in spacing may be necessary where the contour furrow method is used. Such furrows should not be more than 5 chains in length and should have a fall of no more than 2 in. per chain. Fertilizer is placed along the bottom and one side of each furrow, then a second furrow is made adjacent to each original furrow in such a manner that the fertilizer is covered by the soil so moved. Irrigation water is run down the new furrows, and the land is ready for transplanting.

For Spray Irrigation.

If spray irrigation methods are to be used, the final preparation will depend on the methods to be adopted at planting time. Procedures will vary somewhat according to whether planting is to be carried out before the initial spraying or after. It is usual, however, for the fertilizer to be placed in furrows and covered, but the land is left flat and not formed into hills. This means that the land is then ready for either hand or machine planting.

As spray irrigation will tend to find its greatest use on land which is too sloping or too irregular for furrow irrigation, the necessity for planting on the contour as a soil conservation measure should be always kept in mind, as under rain-grown conditions, contour planting will reduce the runoff of the spray irrigations and hold the water where the crop can make use of it.

For the Watering-out Method.

The "watering-out" method is used where there is sufficient water available to establish the seedlings but insufficient to carry the crop through. Crops grown by this method are therefore intended to be produced under rainfall conditions, but with the additional safeguard of a good watering for the seedlings at transplanting time.

Under this method, the land is harrowed and drilled to a 4 ft. spacing, the drills preferably being placed on the contour. The gradient of these contour drills should be slightly greater than that recommended for furrow irrigation, but should be no more than 4 in. to the chain.

The furrows so opened are fertilized either by hand or by machine. A disc implement of the "wiggletail" or "cotton king" type is then run over the furrows to leave a planting hill in its place. Such hills should be low and wide rather than high and pointed. In some cases, after fertilization a scuffler is passed along the row to mix the fertilizer with the soil prior to hilling up.

After hilling up, holes are made with a hoe along the top of the hills to mark the plant positions. Water is poured into the holes thus made, and planting takes place in the wet soil.

For Rain-grown Conditions.

If the crop is to be grown solely under rainfall conditions, it is usual to proceed as in the watering-out method, but no watering holes are made in the hills. Plants are placed directly into the wet hills after rain.

FERTILIZERS.

Most of the tobacco soils in use are inherently low in essential plant foods. They are also low in organic matter, which plays a very important part in the physical, chemical and biological condition of the soil. It has been found, therefore, that to obtain the best results it is necessary to supply

artificial fertilizer in quantities which will produce adequate yields and at the same time provide leaf of the required aroma, elasticity and quality.

Where it is intended to use soils of a very sandy nature or new land freshly broken up, the fertilizer should conform to the 4:11:6 formula —that is, contain 4% nitrogen, 11% phosphoric acid and 6% potash. Where richer or better class sandy loams are used, where tobacco follows a green manure, or where a legume has been growing for no longer than two years, the formula used should be 2:17:4, the plant-foods being indicated in the same order as before. On still richer soils, such as the red basaltic clays, superphosphate may be the only plant food required.

Quantities used per acre vary from 200 lb. to 600 lb., depending on the natural fertility of the soil. Insufficiency of these main plant foods is reflected in poor growth of the plant and pale colour of the leaf during growth.

CROP ROTATIONS.

The majority of soils on which tobacco is grown are basically low in organic matter. This condition is aggravated by continued cultivation. In addition, the use of irrigation water in large quantities helps to break down the physical condition of the soil. It destroys the natural crumb structure and causes the finer particles to merge and cling together in great clods or lumps.

It has been found that this condition of the soil can be greatly improved by the addition of organic matter such as decaying plant tissues. This can be done by the turning under of a large body of green manure in the form of maize or sorghum, or by the growth of a suitable grass for a short period of time. Rhodes grass has shown its suitability for the purpose, as it produces a large volume of root growth which is continually decomposing and being replaced by new growth.

The majority of legumes which could be grown in rotation with tobacco harbour the root knot nematode, and it would therefore be unwise to use such plants for the purpose of soil renovation. In addition, the use of leguminous cover crops on many tobacco soils results in too high a nitrogen content for the production of good quality leaf.

There are, however, two legumes which provide useful cash crops and which do not harbour the nematode. They have demonstrated their suitability for inclusion in a crop rotation with tobacco.

The first of these is the peanut. It can be grown on all Mareeba-Dimbulah tobacco soils provided due regard is given to variety. It has been shown that this crop causes a considerable reduction in the nematode population in the soil while providing a source of income to the grower. The second is the velvet bean, the seed of which is sought by coastal cane-growers.

Rotations such as peanuts/maize and velvet beans/Rhodes grass/tobacco; or maize and velvet beans/Rhodes grass/tobacco; or Rhodes grass for two years followed by tobacco; are offered for consideration. It is found that the inclusion of Cusara pea in the rotation on sandy loams may also give financial and agricultural benefits.

The common farm practice of allowing the land to revert to weeds between tobacco crops does not produce as good results as a rotation system such as outlined above.

VARIETIES.

As varieties react differently under varying climatic conditions on the same soil type, it is difficult to make a general recommendation for any one area. However, Gold Dollar, Kelly, 402, and Virginia Gold have generally given good results on the lighter soils, ranging from sandy loam to loam. On heavier soils, the varieties Hicks

and Yellow Special can be expected to give a heavy yield of bright leaf provided care is taken to avoid the use of too much nitrogenous fertilizer. On such soils and with these varieties, the 2:17:4 formula can be used to advantage.

In the past, varieties which gave good all-round results on a wide range of soil types were Gold Dollar, Kelly and Virginia Brightleaf. Kelly lost favour at a time when seed stocks became badly contaminated. It was, however, strong in the stem and could withstand wind reasonably well. It yielded very bright leaf, and as new stocks of seed have been available for some years past, it may still be worth a trial in these districts.

Gold Dollar was for nearly 20 years the most popular variety and it is only in the last few years that its place has been taken by Hicks. Gold Dollar, and to a lesser extent Virginia Brightleaf, owed their popularity to their recuperative powers after adverse conditions, also to their capacity to produce bright leaf of good quality.

Hicks, Virginia Gold and 402 are at present three of the varieties in greatest demand. These varieties will yield well and produce bright types of leaf such as are required by the present-day market. Virginia Gold must be fully ripe when harvested, otherwise green-cast leaf will result. This variety is fully three weeks later in maturity than Hicks.

SEEDLING PRODUCTION.

The production of well-grown, healthy, vigorous seedlings is a necessity if the maximum return is to be achieved from a tobacco crop.

The construction of seedbeds may vary, depending on whether seedlings are being prepared for an irrigated crop or for one grown entirely under seasonal rainfall conditions. The procedures adopted in each case, however, are fundamentally the same.

When produced for a rain-grown crop, the seedlings may have to remain longer in the seedbeds, thus unduly exposing the roots to possible nematode atack. In order to avoid this, the concrete tray type of seedbed is recommended in these circumstances.

Site and Drainage.

The site chosen should be in close proximity to permanent water, the water being pumped to a tank from which pipes are laid to the seedbed area.

The area should be protected as far as possible from prevailing winds, as these quickly dry up moisture and have an adverse effect on the young seedlings. The site should be very well drained, and in no instance should it be situated where water tends to lie.

A new area should be chosen each year owing to the susceptibility of the plant to nematode infestation and the need to avoid infection from diseases carried in the soil and on tobacco debris remaining from the previous season.

Soil.

Seedbed soils of necessity vary considerably with the locality, but if possible a well-drained sandy loam should be chosen. It is beneficial for the soil to be of light texture and of a friable nature to allow it to break down to a fine surface tilth when formed into a bed. The ploughing-under of large quantities of animal manure, grass or green manure immediately prior to the preparation of the seedbed area should be avoided, as unhealthy seedlings showing "yellow patch" symptoms may result.

Seedbed Area.

In the past, it has been the practice to allow 100 sq. ft. of seedbed area per acre of cultivation. On irrigated farms, however, seedlings can be transplanted as soon as they are ready, and the seedbed area can consequently be

reduced. For an acre of irrigated tobacco, 1½-2 beds, each 10 ft. by 4 ft., are sufficient. It is a good practice to transplant into the field at intervals, and seedbed sowings should be arranged to provide for this.

On non-irrigated tobacco farms, staggered plantings are necessary to provide for transplanting when adequate rains occur. A larger area of seedbed per acre must be provided to allow for uncertain weather conditions.

Size of Seedbeds.

It has been found that beds constructed 10 ft. long and 4 ft. wide are a very suitable size when using galvanized iron covers (or similar portable covers) for benzol fumigation purposes.

As many of these beds as desired may be constructed in line with one another, thus presenting an orderly appearance. It is usual to allow 2 ft. between beds as pathways.

Preparation of Seedbed Area.

The first operation in preparing the beds after the site has been selected is to plough the land some months before it is intended to form the beds for sowing. After the soil has been left in the rough for some time, it is again ploughed and harrowed to reduce it to a reasonably fine tilth. The area is then sterilized by heat.

After the final preparation, the entire seedbed area is surrounded by wire-netting to keep out small marsupials, fowls and straying stock.

Sterilizing the Soil.

Careful attention to this phase of seedbed preparation is essential. The main purpose in applying heat to the seedbed soil is to destroy nematodes, grass and weed seeds, insects and diseased plant tissue which may be present in the surface soil. The whole of the seedbed site, including the pathways, should be sterilized.

Materials commonly used for the production of heat are light bush timber and the organic material from the interior of certain anthills.

Immediately prior to burning it is necessary to see that the soil is damp, but not too wet, to secure a thorough steaming effect.

When using brushwood, it is necessary to pile it to a height of one to two feet to secure sufficient heat for the purpose of good soil sterilization. When using anthill material, it should be spread evenly over the entire seedbed area to a depth of three to four inches. As a guide, it may be stated that about four cornsacks full of antbed material will be sufficient for a 10 ft. by 4 ft. bed. Due allowance will need to be made for pathways. The material is lit by the use of kerosene or by a small fire at the windward corner of the bed.

The Concrete Tray Type of Seedbed.

Where it is expected that seedlings will remain longer than usual in the seedbed before being planted out into the field, a concrete tray type of seedbed is satisfactory. This is made 10 ft. long and 4 ft. wide, so that the standard covers for benzol fumigation will just fit within the enclosure. Sterilization takes place as for the other type of bed as already discussed.

The advantage of this type of seedbed is that, should it be necessary to keep the plants in the beds longer than the usual period of six weeks, they will remain free from nematodes. The roots are usually much more numerous and bunched in habit than those of seedlings grown under ordinary conditions. Experienced growers claim that such seedlings give a very high percentage strike in the field.

Seedbed Fertilizer.

After unburnt material has been raked off, the beds are dug lightly to incorporate the ashes into the soil and

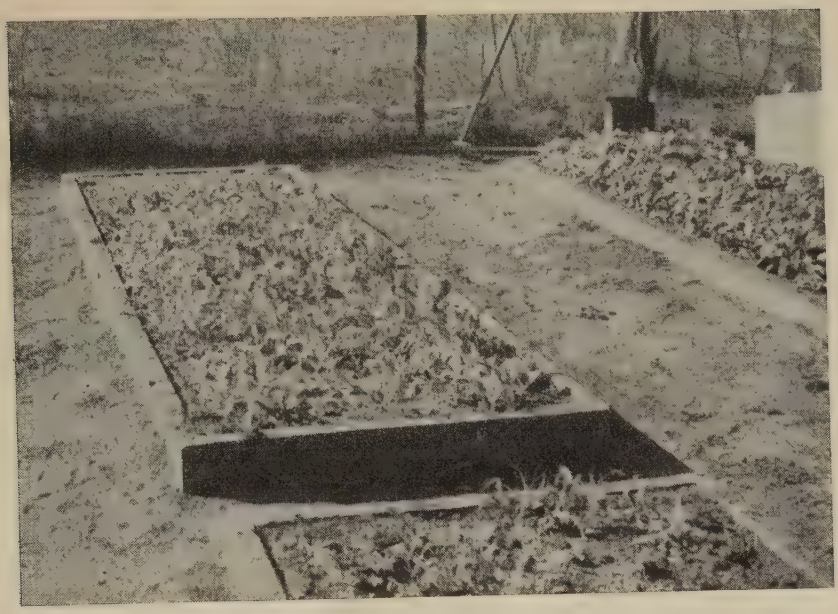


Plate 5.

The Concrete Tray Type of Seedbed. This type is well suited for rain-grown crops, where the seedlings may have to remain for some time until suitable planting rains occur.

the surface is then smoothed. The beds may be slightly raised above surface level for drainage purposes.

When fertilizing the seedbeds, great care must be taken not to use excessive nitrogen in any of its organic forms (for example, dried blood, cottonseed meal, animal manures). Otherwise, a condition known as "yellow patch" is likely to develop, with disastrous results. It is usual, therefore, to use nitrate of soda as the source of nitrogen. Superphosphate supplies the phosphoric acid, while sufficient potash will normally have been incorporated with the ash.

A dressing which has been found suitable is up to 2 oz. of nitrate of soda and about 4 oz. of superphosphate per square yard. For 10 ft. x 4 ft. seedbeds this is equivalent to ½ lb. of nitrate of soda and 1 lb. of superphosphate per bed.

Seedbed Covers.

In the past it was considered advisable to protect the young seedlings from the direct rays of the sun during the early stages of growth, and covers were used for this purpose. However, experience has shown that this is not necessary, and the only covers now employed are airtight and built especially for the application of benzol fumigant for the prevention of blue mould.

They are made from four 6 ft. x 4 ft. sheets of flat galvanized iron in such a way that they measure 10 ft. long, 4 ft. wide, and 1 ft. high.

As flat iron may be difficult to procure at times, materials such as plywood, building board and bondwood may be used. These materials make excellent covers provided care is exercised during construction to ensure that all joins are airtight.

When benzol fumigant is being used for the control of blue mould, the covers are placed in position during late afternoon and removed the following morning. When the covers are placed over the beds, soil is brought

Plate 6.

Tobacco Seedbeds and Covers. These seedbeds are 10 ft. x 4 ft. in dimensions; the covers, of similar size, are used for benzol fumigation.

up all around the edges and ends to ensure that no leakage occurs. When the covers are removed and neatly stacked in the morning, the seedlings should be watered lightly to wash the young leaves and so prevent possible damage.

Method of Benzol Fumigation.

The most serious seedbed disease is blue mould. Dull, showery, cold weather aids the development of this disease and care in watering must be exercised at this time.

Overnight fumigation with benzol under galvanized iron covers, if properly done, will prevent an outbreak of this disease in the seedbeds. The rate at which to use the fumigant is one square inch of evaporating surface of commercial benzol to each square foot of seedbed. A benzol container at each end of the bed is more efficient than one large container in the centre, as a more even concentration of gas is obtained by the former method. Two containers, each giving a 5 in. x 4 in. evaporating surface, are sufficient for a 10 ft. x 4 ft. bed.

The containers are placed on small platforms sufficiently high to raise them above the level of the plants. The depth of benzol in the containers should be such that, when the covers are removed in the morning, only a small quantity will remain in the bottom.

To be effective, fumigation should be carried out at least each third night. However, when the disease is likely to be active (for example, during cold, showery weather), nightly applications may be required. Fumigation should commence as soon after germination as necessary if conditions suggest the likelihood of blue mould infection. It can be employed at any time after germination has occurred.

Rate of Sowing.

Tobacco seed is very small, about 12 level teaspoons being equal to one ounce, and care must therefore be taken that it is not sown too thickly. Thick sowing is undesirable, as such seedlings will grow very spindly as a result of competition for light and plant foods. Thin, weak seedlings are more subject to diseases than sturdy,

vigorous seedlings and are not ideal for transplanting into the field.

It will be found, therefore, that just under half a level teaspoon of seed will be sufficient for a standard bed of 40 sq. ft.

Time to Sow.

The time of sowing is regulated by the time it is desired to set the plants out in the field. On irrigated tobacco farms it is the practice to have plants ready to set out in the field from the beginning of September until the end of October. Plantings are thus staggered over a two-month period in order that labour, barn space and farm operations can be efficiently regulated. In these cases, seedbeds are sown from mid-July to mid-September. Thus seedlings are about six weeks old when ready for transplanting.

Where the tobacco crop is grown solely by rainfall, transplanting into the field may be delayed by the failure of planting rains at the expected period. To meet this situation, a larger area of seedbeds is required than in the case of irrigated crops, and sowing has to be spread more widely so that suitable seedlings are available when adequate rains occur. Sowing of seedbeds for areas in which the seedlings are watered when set out in the field but are subsequently grown under rainfall conditions takes place in October. Those intended for areas where tobacco is grown entirely on rainfall are sown during November and December.

Method of Sowing Seed.

Due to the smallness of the seed it is the usual practice to place the required amount in a can of water, stir well to keep it in suspension, and water the bed through an ordinary rose, down its length and across its width. This ensures an even distribution of seed over the bed surface.

Another method is to mix the required amount of seed thoroughly with sifted ashes and distribute this evenly over the surface of the bed. The mixture should be firmed into the moist topsoil with a flat board.

After sowing, the surface of the bed is covered with coarse sand to a depth of about one-eighth to one-quarter of an inch. This coarse sand mulch prevents seed harvesting ants from gathering the seed and assists the even penetration of water.

The seed takes about seven days to germinate but this time may vary according to the time of the year sown.

Care of Seedbeds.

Beds are watered by using a fine rose on the end of a garden hose, or by a watering can. In the latter instance, it is usual to have a 100-gallon tank adjacent to the beds, and the water is dipped from it as required. Water must be applied as gently as possible, and not allowed to flow over the surface of the bed. Watering usually takes place twice a day from the time of sowing until the seedlings are an inch or two in height. After this time it may be necessary to control watering in order to stop the plants from growing too quickly, and to lessen the risk of attack by various fungal diseases.

The amount of water to use at each watering should be sufficient to keep the surface damp. In this connection, due regard must be paid to prevailing weather conditions. Overwatering must be avoided. Seedlings are ready for transplanting when about six weeks old and 4-8 in. high.

Seedbed pests and diseases should be combated by regular sprayings, which are usually given about once per week.

Detailed instructions on seedling production are contained in Advisory Leaflet No. 253 of the Department of Agriculture and Stock.

[TO BE CONTINUED.]

FODDER CONSERVATION OVERSEAS.

World-wide emphasis on fodder conservation, with a marked trend towards the greater use of grass silage, has been noted by Dr. W. A. T. Summerville, Director of the Division of Plant Industry in the Department of Agriculture and Stock.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently that overseas interest in fodder conservation was the subject of a special report by Dr. Summerville. During an overseas tour this year, Dr. Summerville studied various agricultural developments in the United States, the United Kingdom and the Continent.

The report states that though fodder conservation is traditional, and all farmers with livestock put away fodder reserves, authorities everywhere are still not satisfied that enough is being done. In most Old World countries, the disparity between costs of production in summer and winter is so great that most of the nutritional studies by agricultural scientists are directed towards reducing winter costs.

Obviously, one of the best ways to reduce costs is to grow fodder in the summer, when production costs are lowest, and to conserve the greatest practicable amount for use in winter, when production is either impossible or very costly.

Summer and winter in these parts are, of course, paralleled in Queensland by good seasons and droughts.

In the United Kingdom and Europe, it is generally agreed that silage is the best form of conserved fodder. The tendency is definitely away from tower silos towards the pit, trench and wedge types.

Grass silage is becoming more and more popular. Generally the aim is to use grass with a protein content of about 12 per cent.

Methods of turning out the best quality silage are the subject of a great deal of research. In particular, the use of additives to assist in the fermentation is being studied. The commonest additive is molasses, using 40 lb. (three gallons) per ton. Sodium metabisulphite is also used, but more commonly in the United States. In some European countries, sulphuric, hydrochloric and formic acids are used extensively. These acids are dangerous and objectionable to handle, and are unlikely to find much favour among Queensland farmers.

Dr. Summerville also reported that the best pastures he has ever seen were those in Switzerland, where elaborate methods of spreading liquid farmyard manure have been in use for a very long time. The average annual cut from these pastures is over 14,000 lb. of dry matter per acre, and lucerne yields nearly 18,000 lb. of dry matter per acre.

Whilst under 2,000,000 acres of grasslands feeds 1,600,000 head of dual-purpose cattle, it must be borne in mind that over 600,000 tons of concentrates are imported into Switzerland each year. These figures give some indication of the type of husbandry practised by Swiss farmers.

Green Manuring in the Granite Belt.

By M. A. HANNIGAN, Senior Adviser in Horticulture.

Supplies of organic matter are extremely low in most of the granitic soils of the Stanthorpe district. As the amount of organic matter and its decomposition product, humus, influence both the texture and fertility of the soil, it is not surprising that green manuring is more widely practised in this area than in many other parts of the State.

The rainfall is somewhat erratic in the Granite Belt and any attempt to grow a green manure crop in summer would almost certainly adversely affect fruit trees during stress periods when temperatures are high and soil moisture reserves low. Quite apart from this fact, summer green manures would impede orchard operations such as thinning, spraying and harvesting.

In winter, on the other hand, deciduous fruit trees use very little water and a green manure crop then presents no major hazard.

The principal green manure crops grown during the winter months are New Zealand blue lupin (Plate 1), golden tares and black winter rye. New Zealand blue lupin does better than other legumes and yields of up to 16 tons green matter per acre are common. Golden tares produce less bulk but withstand frost and dry conditions fairly well; they are sometimes grown alone but more usually in combination with a cereal such as black winter rye. Of the available cereals, black winter rye is preferred since it not only thrives in the district but has also the additional merit of being very hardy.

Time of Planting.

A good green manure crop can only be expected when the soil moisture at the time of planting is sufficient to germinate the seed quickly and good rains fall during the early stages of growth. February is the best month for sowing; plant growth is rapid and the crop is well advanced at the beginning of winter and better able to withstand lower temperatures in June and July.

The land should be prepared in late January for planting as soon as the soil is sufficiently moist to ensure good germination.

The crop is sown in various ways. A seed drill is undoubtedly the best for establishing the crop but broadcast sowing is more commonly practised, the seed being covered with a tandem disc, rotary hoe or tine harrows. New Zealand blue lupin should be planted at a depth of about 2 inches, but smaller seeded crops may be established at shallower depths.

Plate 1.

New Zealand Blue Lupin, the Most Widely Grown Green Manure in the Granite Belt.

Rates of Sowing.

The initial sowing of New Zealand blue lupins is made at the rate of 1 bus. per acre but slightly more than this amount should be used if the seedbed is poor or soil moisture below the optimum for germination. Where the crop is grown in successive years on the same ground, some volunteer growth occurs and the rate of sowing in the second and subsequent crops can be reduced to ½ bus. per acre.

Golden tares are planted at a rate of 1 bus. per acre but this quantity of seed can be reduced to 2/3 bus. if the crop is established in combination with a cereal such as black winter rye.

Black winter rye is usually sown at the rate of 1 bus. per acre; heavier sowing seldom makes any appreciable difference in the yield of green matter. When planted with a legume such as golden tares, the amount of seed per acre is reduced to ½ bus.

Where the green manure is a legume and is being grown for the first time in the orchard, the seed should be inoculated with a suitable strain of nitrogen-fixing bacteria as a safeguard against possible crop failure from faulty nodulation of the roots. Inoculated seed is sown within a few hours of treatment and must be covered with soil immediately. If the seed is drilled in, it is automatically covered, but where broadcast sowing is practised harrows should be working when planting is in progress. On no account should inoculated seed be mixed with fertilizer at the time of planting.

Plate 2.

Black Winter Rye, a Cereal Grown as a Winter Green Manure at Stanthorpe.
It is a hardy plant and produces a large bulk of green matter.

Fertilizing.

The primary object of a green manure crop is bulk (Plate 2), and fertilizers are invariably necessary in the Stanthorpe district for the production of worthwhile crops. Even though the green manure does not provide an immediate cash return to the grower, the cost of fertilizer is ultimately recovered from the orchard trees, which benefit from the decomposing residues.

The fertilizer should be broadcast and ploughed into the soil about one week before sowing. A mixture containing equal parts of sulphate of ammonia and superphosphate applied at the rate of 2 cwt. per acre, or alternatively 3 cwt. of 4-15-2 complete mixture, is suitable for legumes. Superphosphate is seldom necessary for cereals in regularly fertilized orchards in the Granite Belt, but a response can be expected from a pre-planting dressing of sulphate of ammonia at the rate of 1½ cwt. per acre.

Turning in the Crop.

A green manure crop established in a deciduous fruit orchard in February should be turned under at or shortly after flowering when it has reached its maximum green weight. If the crop is planted late, however, it may compete with the trees for soil moisture when growth is resumed in spring. There is also a risk that the decomposition of the raw organic matter turned into the ground will cause a temporary shortage of nitrogen in the soil and have a harmful effect on the trees.

In order to avoid these hazards, all green manure crops must be turned under some weeks before bud-burst begins in the orchard. The period varies from 6 weeks before bud-burst in the case of cereals to 3 weeks in the case of legumes which decompose more rapidly.

Until recently, green manure crops were often ploughed into the ground, a practice which gave little or no protection against soil erosion during storm rains in spring. A better method is to knock down the crop with tandem disc harrows or a rotary hoe operated with a shallow cut. When properly used, these implements leave a 3-inch cover of raw organic matter mixed with soil on the surface which both conserves soil moisture and lessens the risk of soil movement.

HAVE YOUR SEEDS TESTED FREE

The Department of Agriculture and Stock examines FREE OF CHARGE samples representing seed purchased by farmers for their own sowing.

The sample submitted should be representative of the bulk and a covering letter should be sent advising despatch of the sample.

MARK YOUR SAMPLE

Sample of ..... seed
Drawn from ..... bags
Representing a total of .....
Purchased from .....
Name and Address of Sender
Date.....

SIZE OF SAMPLE

Barley	8 oz.	Oats	8 oz.
Beans	8 oz.	Peas	8 oz.
Grasses	2 oz.	Sorghum	4 oz
Lucerne	4 oz.	Sudan	4 oz.
Millets	4 oz.	Wheat	8 oz.

Vegetable Seeds - ½ oz.

SEND YOUR SAMPLE TO—**STANDARDS OFFICER, DEPARTMENT OF AGRICULTURE AND STOCK, BRISBANE.**

The Grosse Lisse Tomato.

By J. B. DAVEY, Experimentalist, Horticulture Branch.

The tomato is indigenous to tropical America, where it was known to the native races as the "xitomate." After being introduced to Europe early in the 16th century, the plant was widely grown for ornamental purposes but was of little importance as an edible fruit until rather more than 100 years ago.

Since then, research work on varietal improvement has been in progress continuously, particularly in the globe types. As a result, a wide range of varieties is available to-day and these differ in plant type, growth habits, size of fruit, colour of fruit and their suitability for various purposes.

In general, a desirable tomato variety produces high yields of good quality fruit, crops early, continues to bear fruit for a reasonably long period and is resistant to the major diseases. The more important characteristics may be enumerated as follows:—

(1) A vigorous bush which is capable of producing a heavy crop and has sufficient foliage to protect the fruit against sunburn.

(2) A high degree of resistance to disease and freedom from physiological blemishes such as catface.

(3) Earliness of maturity.

(4) Uniformity in fruit size and shape.

(5) Fruit with a deep, rich colour which is uniformly developed both internally and externally.

(6) An abundant firm flesh with little watery pulp.

These characteristics differ from variety to variety and the grower must therefore carefully select a suitable type for his own locality. No one tomato variety has yet been developed which will produce high yields of quality fruit in all districts and which is acceptable on all markets.

Importance of Grosse Lisse.

Since the establishment of the tomato industry in Queensland, many varieties have been grown commercially although there is a distinct preference for globe types. To-day, however, Grosse Lisse is the leading tomato in the Metropolitan and Stanthorpe districts (Plate 1). Its popularity has been achieved very rapidly since the first trial plantings were made in 1943 and a strain known as Q2 is now widely grown. Grosse Lisse contributes approximately two-thirds of the State's annual production of tomatoes.

The Grosse Lisse tomato—the name means "large, smooth" or "large, glossy"—was introduced to Australia from northern Africa by the New

Plate 1.

Ground Crop of Grosse Lisse Tomatoes. Plants in the pre-fruiting stage; the lower hands have set but the bush is still compact.

South Wales Department of Agriculture in 1939. No information is available on the pedigree of the variety and it is assumed that it was derived from a natural cross and then improved by local selection.

Characteristics.

The Grosse Lisse variety has proved to be one of the best of the globe tomatoes introduced to Queensland. Apart from the good plant type and high yield potential, its present standing is perhaps an indication of its suitability for widely separated tomato areas with quite distinct climatic conditions during the growing period.

It is a mid-season tomato which is ready for harvesting approximately 12 weeks after transplanting and produces marketable fruit for a period of about eight weeks if the plants are well grown. The bush is vigorous, semi-erect in habit and somewhat heavily foliaged, which ensures adequate protection of the fruit from sunburn. It is of the indeterminate type—that is, growth of the laterals is continuous and does not end in a flower cluster as does the variety Q3.

The fruit is large, especially in the first hand, and deep globe in shape (Plate 2). It is circular in cross section, but in good strains the longitudinal section is slightly pointed. The stem cavity is shallow with a somewhat large, corky ring, streaks at the stylar end being absent and the scar being very small and slightly depressed. The mature green fruit is pale green with attractive, dark

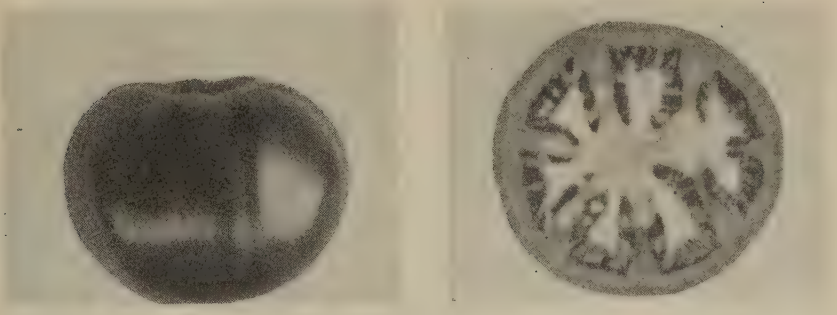


Plate 2.
The Grosse Lisse Tomato.

green shoulders, but on ripening the skin colour changes to an attractive bright red. Internally, the flesh is red with a central mass which is free from fibre and abundantly supplied with juice. The fruit has an attractive flavour, being somewhat sweet and mildly acid.

Yields vary with the district, season and cultural conditions, but 500 half-bushel cases per acre can reasonably be expected from ground crops in the Metropolitan district. In trellised and cradled crops (Plate 3) 1,000 to 1,200 cases per acre is not uncommon.

Plate 3.
Cradled Crop of Grosse Lisse Tomatoes. Cradling, like trellising, is a popular method of supporting the plants in the Metropolitan district.

Defects.

In common with all globe types of tomato, the Grosse Lisse variety frequently fails to set fruit satisfactorily during the cooler months of the year when low temperatures upset the mechanism of fertilization. This precludes the field planting of the variety in southern coastal Queensland from the end of March to the end of June. To breach this gap in the seasonal planting schedule, winter plantings in this area are restricted to the English cluster types such as Salads Special and Potentate.

The main plantings of Grosse Lisse in the Metropolitan district are made between January and March for an autumn crop and during July and August for a late spring crop. Autumn plantings are generally heavy and usually satisfactory, although in some seasons failures from target spot and wilt have been observed. Spring crops are, however, somewhat unreliable; the initial growth of the plants when they are set out in the field is rather slow and blossom end rot may be troublesome, particularly when the crop is staked or trellised and soil moisture is below the requirements of the plant.

Two defects—puffiness and internal breakdown of the fruit—have been observed during recent years. Puffiness is sometimes prevalent in late picks from an autumn crop and is attributed to faulty pollination associated with low temperatures. Fruit affected with internal breakdown shows no external symptoms, but on sectioning, a blackening of one or more locules is apparent. This disorder, which is probably physiological, occurs more commonly in fruits on the first hand; it is generally of minor importance, although wastage has reached commercial proportions on one or two occasions.

RESTRICTIONS ON IMPORTATION OF PLANTS.

Lack of knowledge by the general public of the regulations covering the importation of plants into Australia is forcing quarantine officers at Queensland ports to destroy one or more parcels of imported plants every week.

Stating this to-day, Dr. S. A. Trout, Director of Horticulture in the Department of Agriculture and Stock, who is also Chief Quarantine Officer for Plants (Queensland), pointed out that, under the Commonwealth quarantine regulations, the only importations of plants or planting material permitted are those made by registered importers of nursery stock. Nurserymen registered under the Queensland Diseases in Plants Acts are also required to be registered under the Commonwealth Quarantine Act if they desire to import planting material. They should consult the Department of Agriculture and Stock, which administers the Commonwealth plant quarantine regulations in Queensland.

In all other cases, introduction of overseas material is totally prohibited, and consignments reaching Australia are therefore destroyed. Destruction of the plants means a financial loss to the consignee.

Many people, especially enthusiastic home gardeners, are buying expensive plants overseas and paying air freight on them. A certificate of health from the exporting country is, in itself, not sufficient to enable plant material to be imported.

Strict quarantine regulations are necessary, particularly as fast air transport now increases the risk of bringing exotic plant diseases into the country undetected. Once introduced, such diseases are likely to spread rapidly through whole districts. The approved and registered importers are required to grow introduced plants in quarantine for a period, during which they are inspected at intervals by horticultural authorities.

Control of Apple and Pear Pests in the Granite Belt.

By A. W. S. MAY and M. BENGTSON, Entomology Section.

Though many pests are associated with apples in the Stanthorpe area, those likely to be encountered each season are codling moth, light-brown apple moth, mites, woolly aphid, and fruit fly. These destroy fruit, damage foliage or retard growth, and specific control measures must be applied if orchardists are to obtain profitable yields.

Successful control of these pests depends mainly upon effective insecticides, thorough spraying and the proper timing of spray applications. For correct timing it is essential that growers recognise the several pests and have some knowledge of their seasonal behaviour.

The several apple pests, with the exception of woolly aphid, will also attack pears, and the information and recommendations given below are also applicable to the protection of these fruit.

CODLING MOTH.

The larvae or grubs of the codling moth enter the fruit and tunnel to and feed upon the developing seeds and surrounding tissues. Damaged fruit usually fall from the tree. As sprays are applied to prevent grubs entering the fruit, a knowledge of the periods of major moth activity is important in the successful control of this pest.

During spring the moths emerge from cocoons spun by over-wintering larvae located under bark, in crevices on the trees, amongst refuse in the orchards, or amongst cases and packing material in or near the packing sheds. Eggs are deposited singly on the trees and these give rise to the first generation of larvae, which attack the newly formed crops. Larval development is complete by early summer, cocoons are then spun, and moths again emerge in midsummer. No

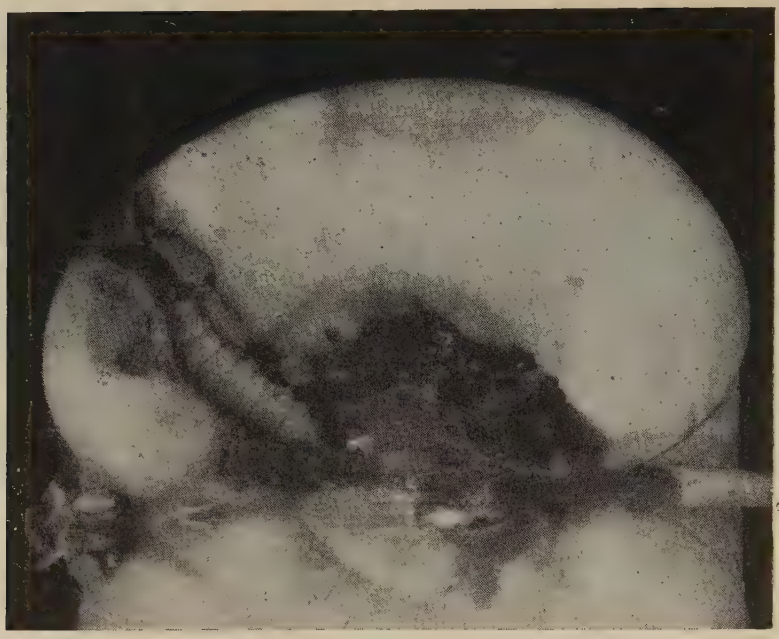


Plate 1.

Codling Moth Larva Tunnelling in Fruit.

exact time can be given for this emergence, which depends to some extent on weather conditions. It may occur between late December and early February, but usually in early January.

Moths are attracted to traps baited with a suitable lure, and the numbers caught at regular intervals indicate activity throughout the season. For many years the Department has maintained traps at selected sites, and by medium of spray notices has advised orchardists of the most appropriate times for spraying. This information should be used according to the requirements for each orchard, as moth populations may vary from orchard to orchard, depending on the efficacy of control measures during the previous season. Where further trapping information is required, the orchardist should maintain his own traps. Details on the care and use of lure traps can be obtained from Departmental officers at Stanthorpe and Toowoomba.

Several insecticides are used for codling moth control, but 0·1% DDT, applied immediately after peaks of moth activity, has proved the most effective. As this insecticide stimulates mites and woolly aphid, it should be used only when necessary.

LIGHT-BROWN APPLE MOTH.

The light-brown apple moth, although closely allied to the codling moth, has different habits. It attacks a wide range of hosts, including apples, pears, grapes, apricots, plums and lupins. The last-mentioned serves as an important source of food during the autumn and winter months, and can be responsible for the presence of an appreciable pest population early in the ensuing fruit season.

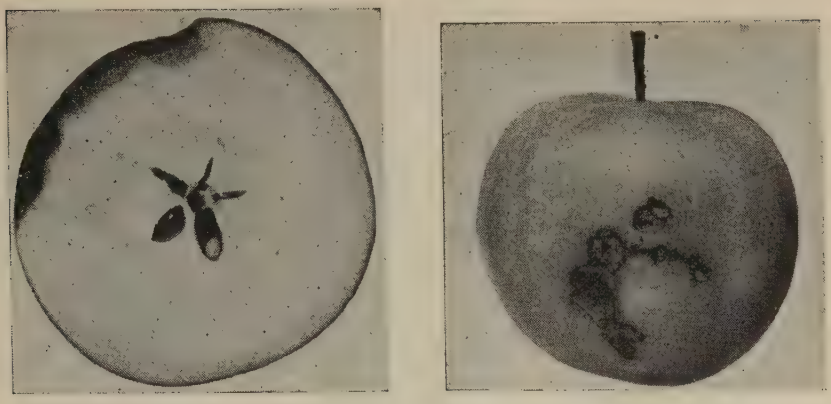


Plate 2.

Light-brown Apple Moth Damage to Fruit. Note that the injury is superficial.

Two or more generations of this pest occur during the growing season; the moths of the first of these commence emerging before early summer. Subsequent generations overlap and extend throughout late summer and autumn. Although moths may be present in orchards from late October onwards, they are most prevalent during the summer months.

Infestations in fruit trees commence following egg-laying on the younger leaves of leaders and terminal growth. The newly hatched larvae feed on the foliage tissues, and spin leaves together to provide shelter. Later, as populations increase, feeding becomes more general, and when fruit are attacked the larvae gouge out areas of skin and underlying tissues beneath touching leaves or between adjacent fruit. Feeding is confined usually to the surface tissues, and burrowing into fruit seldom occurs.

Though of less importance than codling moth, the light-brown apple moth may cause considerable damage in some seasons. The control of this pest is not a difficult problem and the first application of DDD (TDE) should be made soon after larval damage becomes evident in the new growth.

MITES.

Mite damage occurs chiefly on the leaves, but fruit injury may result when large populations are present. These pests feed by piercing the surface tissues and extracting sap from the underlying cells. The first symptoms of mite damage invariably occur on the older leaves both inside and towards the base of the tree. The normal green colour of the leaves is destroyed in the vicinity of feeding punctures and the result is a yellow mottling of the foliage. With the more susceptible varieties, Delicious and Winesap, severely injured leaves eventually redden, and areas of tissue may die. Leaf shedding is not uncommon, and growth may be arrested. When mites are numerous, injury to fruit of red apple varieties prevents normal colouring.

Plate 3.
Mite Injury. Left, normal leaf; centre and right, damaged leaves.

Three mites are commonly associated with apples and pears. Two of these, namely Bryobia and an Eriophyid, are chiefly pests of deciduous fruit trees and overwinter in the egg stage on the trees. Egg hatching occurs in spring, when the mites crawl to the foliage and commence feeding. Populations reach a peak by midsummer. During autumn, numbers wane and the overwintering eggs are laid on the spurs and branches.

Red spider, on the other hand, does not pass the winter in the egg stage, and can feed on a wide range of plants. It is not prevalent on the trees until early summer, and if mite control is neglected increases rapidly after DDT sprayings. The peak of activity occurs during late summer and early autumn.

Where dormant or semi-dormant oil sprays have been used, Bryobia and Eriophyid mites are seldom of importance during the following summer. These sprays, however, have little effect on red spider, and summer treatments are necessary for the control of this species. One spraying is seldom sufficient, and usually two closely spaced applications are required. The summer sprays, which also deal with survivors from the winter oil sprays, should be applied thoroughly during November or early December before mite populations are large. Many chemicals have been tested against mites, but parathion (E605) has been found most effective against all three species, and particularly in controlling red spider.

WOOLLY APHID.

Woolly aphid is not of general importance in the Stanthorpe district, but in some seasons may become a pest of apples and requires specific attention in a few orchards. It overwinters on the trees, and in early spring may be found on the spurs and old pruning cuts. Under favourable conditions this pest rapidly increases in numbers, spreads to new growth and causes a characteristic galling of stems. Growth may be checked and a sticky secretion from the aphid cover fruit and branches. Sooty mould develops rapidly on this secretion and lowers fruit value.

The winter oil and early summer parathion sprays for mite control also control woolly aphid. The woolly aphid parasite does not obviously check pest populations before late summer.

Plate 4.

Twig and Spur Galling Caused by Woolly Aphid.

FRUIT FLY.

The general and widespread use of DDT for codling moth control and suitable harvesting arrangements have reduced the importance of this insect as a pest of apples and pears. In years favourable to fruit fly, however, losses may occur to early and mid-season varieties in orchards where DDT has not been used during the summer months. Furthermore, the likelihood of damage by this pest increases in late summer after DDT applications for codling moth control have ceased. Growers should be prepared therefore to take measures against this pest for the protection of late-maturing varieties.

No fixed rule can be laid down concerning the possibilities of fruit fly attacks, as populations will differ greatly from orchard to orchard. The use of lure traps before varieties are due to mature will provide growers with definite information on the need for preventive spraying.

DDT sprays, applied soon after fly activity has been demonstrated by trapping, will minimise damage by this pest. A partial cover spray of 0.2% concentration can be used, although a 0.1% spray will suffice when populations are small, or when used jointly for codling moth control.

SPRAYING PROGRAMMES.

It is impracticable to draw up a comprehensive and entirely effective spraying programme to satisfy requirements in all orchards. Pest populations, spraying machinery and the standard of spray application vary considerably and the orchardist must regulate his programme accordingly. The following, with codling moth control as the basis, will serve as a guide, and with minor modifications can be adapted to suit conditions in most Stanthorpe apple and pear orchards.

Adequate spray pressure and complete coverage are desirable against all pests and are essential against mites, woolly aphid and the light-brown apple moth.

Apple and Pear Pest Spraying Programme.

JULY TO SEPTEMBER.

Dormant or Semi-Dormant Period.

Use *one* of the following:—

Dormant oil—July or early August.

Semi-dormant oil plus lime sulphur—September at green tip.

Superior oil—According to label instructions.

These sprays will prove effective against the over-wintering stages of mites and woolly aphid, and will also control the San José scale should it be troublesome.

October.

Calyx Spray.

(*When moth populations are small this spray need not be applied.*)

Use *one* of the following:—

Lead arsenate; white oil (3lb.; 2½ pints; 100 gal.).

Lead arsenate; zinc sulphate; hydrated lime; white oil (3lb.; 1lb.; 2lb.; 2½ pints; 100 gal.).

DDT (0·1%).

This spray is applied after the majority of petals has fallen, but before the calyces are closed.

Early November.

(About two weeks after time for calyx spray.)

(*This period is important for codling moth control.*)

Use DDT (0·1%) about one week after the peak of moth activity.

Alternative sprays such as lead arsenate, nicotine sulphate/white oil and other combinations may be used instead of DDT if moths are not prevalent.

To avoid undesirable residues, lead arsenate should not be used after early November.

Late November.

(Three weeks after early November spray.)

Use a combination spray containing DDT (0·1%), DDD (TDE) (0·1% technical grade) and parathion (E605) (0·01% active ingredient).

Joint control of codling moth and light-brown apple moth can be achieved at this time. Mite and woolly aphid control also commences in this period. When codling moth populations are small the DDT may be deleted. Note that complete tree coverage is essential.

Mid-December.

A further spray for mite control is recommended.

Use parathion (E605) (0·01% active ingredient) not later than three weeks after the combination spray in late November.

If appropriate measures have been taken to control codling moth and light-brown apple moth in early and late November, further sprays against these pests should not be required at this stage.

DDD (0·1% technical grade) may be added to this spray if light-brown apple moth is active.

EARLY TO MID-JANUARY.

Codling moth activity can be expected in this period.

Use DDT (0·1%).

This spray should be applied about one week after the peak of moth activity.

Control measures against mites and woolly aphid should not be required if the appropriate sprays have been applied previously against these pests.

LATE JANUARY TO EARLY FEBRUARY.

Approximately three weeks after the early or mid-January DDT spray, a further spray is required to check light-brown apple moth and codling moth activities.

Use a spray containing DDD (0·1% technical grade) and DDT (0·1%), the latter being included only if codling moth is active.

If the above programme is carried out, further spraying to control pests should not be necessary other than applications of DDT (0·2%) when required for fruit fly control. The timing of sprays for this pest will depend largely on local conditions, and can best be decided by the orchardist.

WARNING.

A health risk is involved if parathion (E605) is inhaled or absorbed through the skin. Care should be taken to avoid inhaling this insecticide or being unduly wet by spray. Splashes of the concentrate should be washed off immediately with soap and water, and any clothes which are splashed should be changed immediately and not worn again until they have been washed.

Scientific Names of Pests and Parasite.

Codling moth	*Cydia pomonella* (L.)
Light-brown apple moth ..	*Tortrix postvittana* (Walk.)
Mites	*Tetranychus urticae* Koch (red spider), *Bryobia praetiosa* Koch, and an unidentified Eriophyid.
Woolly aphid	*Eriosoma lanigerum* (Hausm.)
Fruit fly	*Strumeta tryoni* (Frogg.)
San José scale	*Quadraspidiotus perniciosus* (Comst.)
Woolly aphid parasite ..	*Aphelinus mali* (Hald.)

The Honey Flora of South-eastern Queensland.

By S. T. BLAKE (Botanist) and C. ROFF (Adviser in Apiculture), Science Branch.

(*Continued from page* 214 *of the October issue.*)

WILD MAY.

Botanical Name.—*Leptospermum flavescens* Sm.

Other Common Name.—Tea tree (this name is used for quite a number of trees and shrubs).

Distinguishing Features.—A slender twiggy shrub with small, narrow, scented leaves, and white flowers with five spreading petals and 20 or more shorter stamens (Plates 133-134).

Description.—This is a slender twiggy shrub up to about 10 ft. high with dull green foliage. The leaves are very numerous but small, not arranged in pairs, about $\frac{1}{4}$-$\frac{1}{2}$ in. long, about $\frac{1}{16}$ in. wide, blunt, and having no distinct stalk. The flowers are singly arranged amongst the leaves but may be very numerous. They are about $\frac{3}{8}$ in. wide when open, and white or almost white in colour. The calyx has no hairs, and the sepals are short and broad. The petals are broad and have very short stalks. There are about 20-25 stamens shorter than the petals. The ovary is enclosed in the calyx and there is a short style. The seed-capsule splits open with five claw-like valves.

Distribution.—Widely distributed in south-eastern Queensland, chiefly in forest country on sandy or stony ground, sometimes forming dense undergrowth. Widely spread in coastal and subcoastal Queensland and New South Wales, in Victoria and in Tasmania.

Usual Flowering Time.—October-November.

Colour of Honey.—Dark amber.

Importance as Source of Honey.—Medium.

Importance as Source of Pollen.—Medium.

General Remarks.—Wild may is a source of both pollen and nectar. The honey has a strong flavour and when first stored in the cells is thin: shortly afterwards, however, it commences to "jelly" and then is difficult to extract. Although of little value for table purposes, it is a good beefood and is usually left in the colony.

Plate 133.

Wild May (Leptospermum flavescens). Flowering twigs.

Plate 134.

Wild May (Leptospermum flavescens). Gumdale.

A Wild May.

Botanical Name.—Baeckea virgata (Forst.) Andr.

Distinguishing Features.—A bushy shrub with small leaves arranged in pairs close together along the twigs and small stalked bunches of small white flowers, each with five rounded petals on top of the ovary and 5-15 short stamens. The bush resembles other wild mays such as *Leptospermum flavescens,* but the leaves are in pairs and the flowers are in stalked bunches (Plates 135-136).

Description.—This is a green or dark green twiggy shrub mostly 4-10 ft. high. The leaves are very numerous with hardly any stalks and are arranged in pairs along the twigs in such a way that each pair is at right angles to the pair above and below; they are mostly oblong or nearly so, blunt or pointed, about $\frac{1}{4}$–$\frac{3}{8}$ in. long and about 1/16 in. wide. The flowers are stalked in little stalked bunches towards the

ends of the twigs; they are white in colour and about ¼ in. wide, with five very small sepals, five rounded petals attached to the top of the ovary, and 5-15 very small stamens. The seed-capsules are about ¼ in. long and wide and open at the top in three valves.

Plate 135.

A Wild May (Baeckea virgata). Flowering branchlet.

Distribution.—Moreton, Wide Bay, and the north-eastern part of the Darling Downs Districts in forest country, sometimes along creeks or on damp slopes, usually as small patches. It is also found in coastal New South Wales and in New Caledonia.

Usual Flowering Time.—October-December.

Colour of Honey.—Dark amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Medium.

General Remarks.—The nectar and pollen from this wild may is an excellent bee-food and encourages brood-rearing.

The honey is not gathered by bees in extractable quantities.

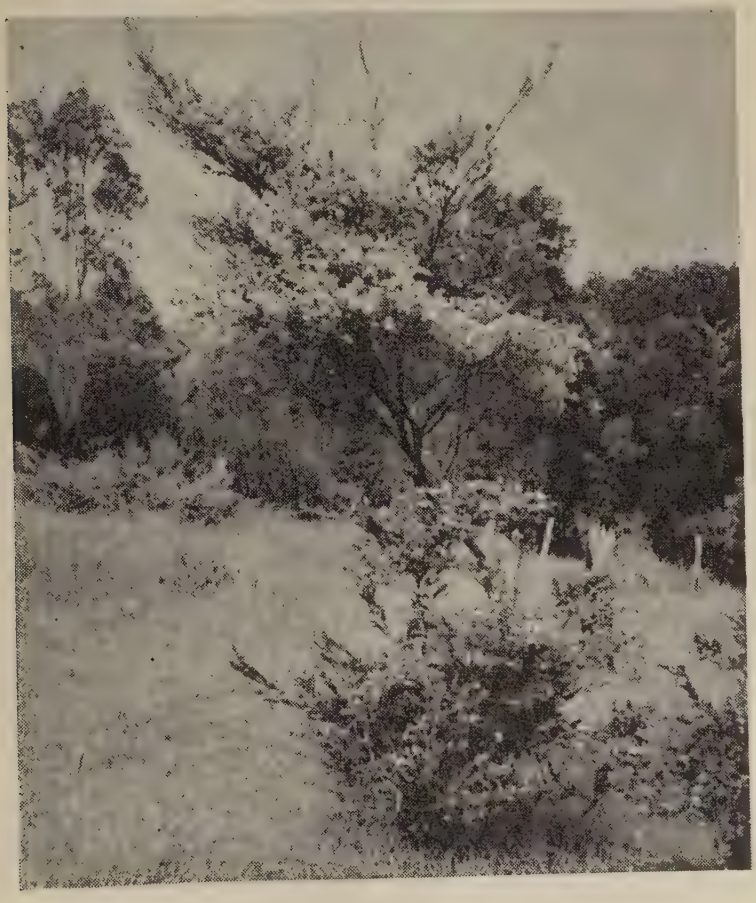
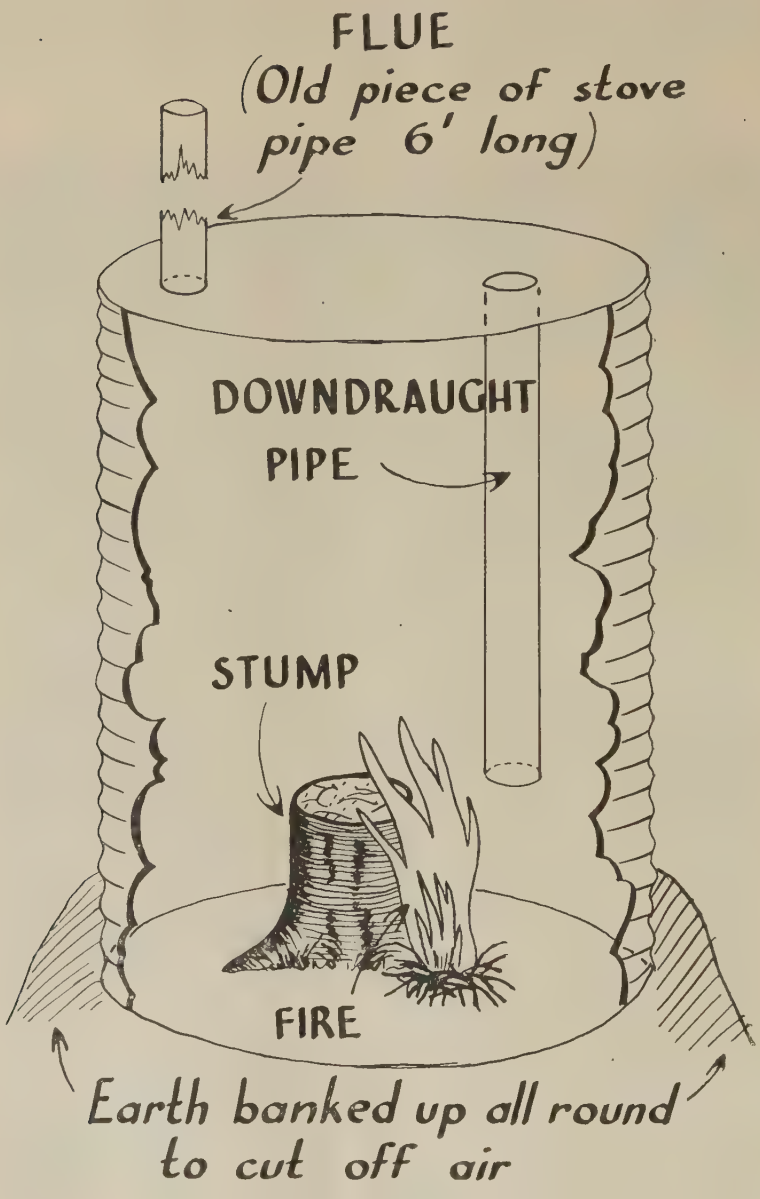


Plate 136.

A Wild May (Baeckea virgata). Upper Pimpama.

[TO BE CONTINUED.]



A STUMP INCINERATOR.

Where a few large stumps have to be disposed of, an old galvanised iron tank may be used as shown above as an incinerator. A dry stump will smoulder for many days until destroyed, and the larger roots also burn.

The Supplementary Feeding of Sheep in Queensland.

Part 6. How to Feed a Supplement.

By G. R. MOULE, Director of Sheep Husbandry.

The ration you choose will depend on the economics of hand feeding, as well as on the condition of the pastures.

In trials conducted in the Springsure district in 1929 by officers of C.S.I.R.O., up to 0.7 oz. of a mixture of bloodmeal and salt was eaten by young sheep each day for five months. Actually, there were about two initial months on approximately half ration and four months on about full supplement. This meant they ate the supplement at the rate of 1,250 lb. per 1,000 sheep per month. On today's prices this would probably cost something like £25 per 1,000 sheep per month, or £125 for the few months when they ate the supplement.

During the ensuing two years the sheep that were fed cut between 1.25 and 2.2 lb. of greasy wool more than those that were not fed. At 5s. per lb., that represents additional earnings of £430 per 1,000 sheep per year. This is a worthwhile profit, but whether it would always be so will depend upon market conditions.

If you decide to feed your sheep a supplement you can choose between several rations. Proprietary lines include a mixture of dehydrated molasses and meatmeal, and sheep "nuts."

The former usually has a high protein content. It can be handled easily and can be placed near watering points where sheep congregate. Field observations by officers of the Sheep and Wool Branch showed that sheep eat between 2 and 3 oz. per head per day of this product during dry times. This would provide them with about 1.8 to 2.7 oz. of crude protein per head per week, as well as some of the essential minerals such as copper and cobalt.

The protein content of sheep nuts may vary between about 20 per cent. and 40 per cent. depending on the formula used in their preparation. When fed at the rate of 1 oz. per head per day, nuts containing 20 per cent. protein would provide sheep with 1.4 oz. of crude protein per head per week; at 4 oz. per head per day they would provide about 5.6 oz. of protein per week.

The protein-rich meals, such as linseed meal, cottonseed meal, liver meal, bloodmeal and meatmeal, are most conveniently fed in mixtures with other foodstuffs. A suitable mixture for ewes can be made from equal parts by weight of protein meal, salt and finely-ground limestone. This can be bound together with a solution of diluted molasses, and can be fed in troughs near watering points. If the grass becomes very dry the amount of meal can be doubled or trebled and the mixture can be fed at the rate of 2 oz. or more per head per day. The way in which this increases the amount of nutriment the sheep receive is summarised in Table 1.

TABLE 1.

PROTEIN SUPPLIED BY MIXTURES FED AT THE RATE OF 2 OZ. PER HEAD PER DAY.

Proportions of Foodstuffs by Weight.			Crude Protein per Head Per Day.	Crude Protein per Head Per Week.
——	Salt.	Limestone.		
			Oz.	Oz.
Meatmeal—				
1 ..	1	1	0·4	2·8
2 ..	1	1	0·6	4·2
3 ..	1	1	0·72	5·0
Cottonseed Meal—				
1 ..	1	1	0·26	1·8
2 ..	1	1	0·4	2·8
3 ..	1	1	0·48	3·4

Mixtures of this type are most useful to young sheep and to breeding ewes when the grass is dry—that is, when its protein content is as low as 3% or 4%. In north-western Queensland this may occur by June or July; in the central-west by August or September if no rain fell during the winter. As the summer rains are the most reliable in most of the sheep pastoral country, it may be necessary to continue feeding a supplement until January or February—that is, for anything up to six months. At an average daily intake of slightly more than 2 oz. per head per day, this would require about 2 tons of the supplement per 1,000 sheep per month. If the mixture costs £45 per ton, landed on your property, you need to see a substantial cash return for your investment.

It may seem difficult to assess the value of feeding supplements to young sheep. However, work recently undertaken by Dr. M. C. Franklin of C.S.I.R.O.'s McMaster Laboratory showed how advantageous feeding could be. He fed six groups of young sheep on straw containing 3.5% protein—quite like the natural grasses during the winter in many parts of pastoral Queensland. To one group he gave a supplement of 3.1 oz. of linseed oil meal daily; to another 6.1 oz. of lucerne chaff; to the third 4.0 oz. of a concentrate mixture containing 18.9 per cent. crude protein; to the fourth 3.1 oz. of wheat; and to the fifth group he fed a combined supplement of 3.1 oz. of wheat, 6.25 oz. ground urea and 0.15 gram of sodium sulphate. The sixth group did not receive a supplement.

The results of this experiment are shown in Fig. 1. Those fed supplements maintained their weights satisfactorily. Those in the group that were not fed a supplement lost weight quite quickly and many died.

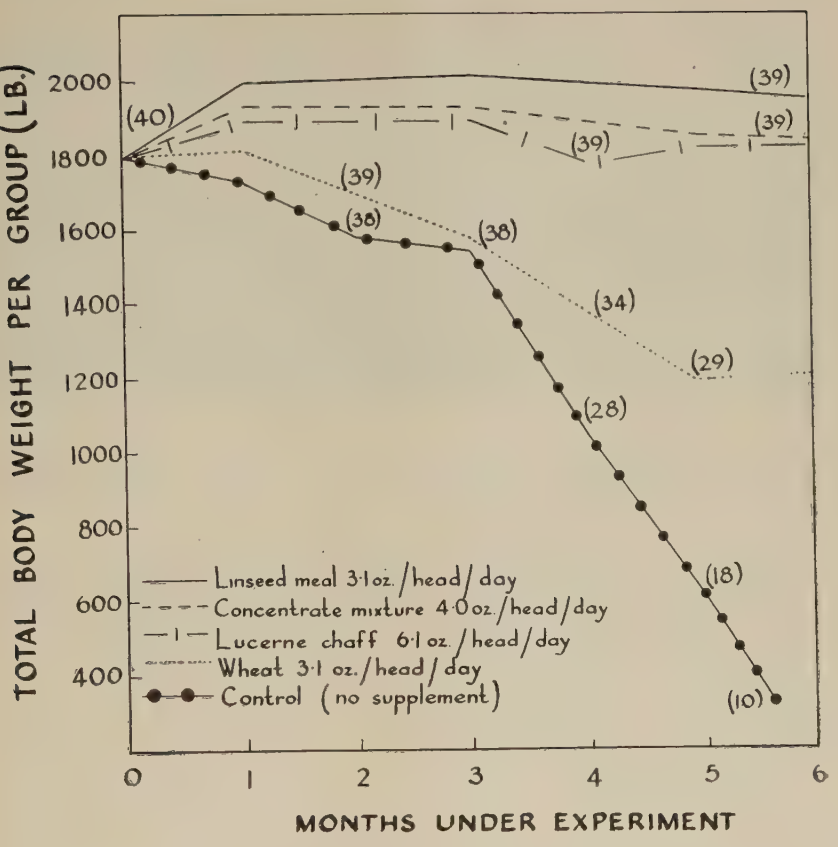


Fig. 1.

Graph Showing Utilisation of Low Quality Roughage by Merino Wethers. The roughage was a mixture of cereal straw chaff and wheaten chaff with a crude protein content of 3.5%. The numbers in brackets indicate the number of survivors, at monthly intervals, from groups of 40 animals at the commencement of the experiment.

The weight changes in the unfed weaners in this experiment are typical of those in young sheep in Queensland. Most woolgrowers recognise the way that weaners "hang fire," even during what appear to be good seasons. In many years losses are heavier amongst weaners than grown sheep. Feeding them a supplement might well be the best way of overcoming this problem.

In any case it is advisable to be sure young sheep have adequate vitamin A when pastures are dry. This can be achieved quite easily by giving them a drench with a vitamin A concentrate.

The energy-rich foodstuffs, such as maize, grain sorghum, wheat and oats grain, are most useful as a supplement during the early stages of drought. They can be used to help maintain the strength and condition of sheep as the dryness of the pastures increases and their nutritive value decreases. They can be fed at the rate of 2 oz. per head per day during the early stages of a dry time, and increased up to 4 oz. per head per day as the quality of the grass deteriorates. Maize can be broadcast, but the other grains are most conveniently fed in troughs. Better results

will probably be obtained by cracking grain sorghum.

All of the grains are particularly short of lime, and best results will be obtained if 1 or 2 lb. of finely ground limestone are added to each 100 lb. of grain. The limestone should be ground finely enough to pass through a 100-mesh sieve.

When feeding grains in this way you are usually trying to bring sheep through the dry months that may herald a drought. It is difficult to put a cash value on the advantages you obtain from doing so. It can mean low drought losses, which are easy to assess. Most important, it can mean that far better use is made of the available roughage that is standing as "hay on the stem." It also means that in the event of a drought developing your sheep are in far stronger condition than they would be if they had not been fed. Therefore, if you have to sell or move to agistment your sheep are more likely to stand the subsequent travelling well. However, feeding grain at the rate of 2 oz. per head per day means almost 2 tons per 1,000 sheep per month, and the cost must be weighed against the advantages.

Incidentally, it is better to feed grain supplements every second or third day or even only once a week if your paddocks are reasonably small and your sheep are used to eating supplements.

It takes sheep about two minutes to eat about 4 oz. of nuts. If small quantities of nuts or grains are fed daily the fast eaters will get more than their share, while the slow eaters will get less. Feeding a larger quantity of nuts or grains ensures more even distribution between the sheep, and they get as much advantage from receiving two supplements each of 7 oz. during the week as they do of receiving seven supplements each of 2 oz. If troughing is used, allow 50 running feet per 100 sheep.

[CONCLUDED.]

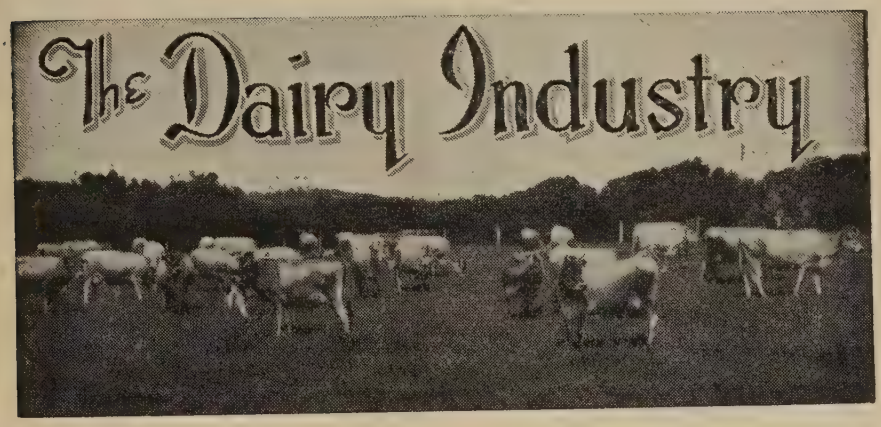
THREE-DAY SICKNESS OF CATTLE.

Outbreaks of three-day sickness or ephemeral fever, the first in Queensland for nearly 20 years, are occurring among station cattle in the area north of Julia Creek and Richmond.

Announcing this recently, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said a report by the Veterinary Services Branch of his Department shows that, in recent weeks, the disease has been present in a number of mobs of cattle coming out of this area. Drovers have either had to cut out and hold sick beasts behind the main mob or where practicable return the whole mob to the property of origin.

Cattle are the only animals affected. In individual animals the disease appears suddenly with a fever that lasts about 24 hours. This is followed by stiffness and lameness that usually clears up in two or three days, but which may persist for up to a week.

If no attempt is made to treat the condition, but shade and water are provided, the recovery rate is usually almost 100 per cent. On the other hand, deaths may result from drenching or driving or from rail transport. Because of this, no treatment other than good nursing is recommended.



Seasonal Variation in the Composition of Milk.

By L. E. NICHOLS and F. G. FEW, Dairy Research Branch.

Factory and depot managers who are handling milk are faced each year with a recurrence of the problem of milk with butterfat tests which fall short of the minimum standard of 3.3 per cent.

During the greater part of the year, attention is centred on the bacteriological quality of milk, but each year from July to September low butterfat tests become a problem requiring the attention of all concerned.

STANDARD OF MILK.

Under "The Dairy Produce Acts, 1920 to 1592" the standard of milk is defined as follows: —

"Milk shall be the normal, clean, fresh secretion obtained by completely emptying the udder of a healthy cow properly fed and cared for, and shall be exclusive of the milk obtained during fifteen days immediately prior to and ten days directly following on parturition. It shall contain not less than eight and five-tenths part per centum of milk solids-not-fat, not less than three and three-tenths part per centum of milk-fat, and not less than twelve parts per centum of total milk solids. It shall not contain any added water, separated milk, preservative, or other foreign substance, and shall not have had any milk-fat removed from it by skimming, separating or any other process. Its freezing point shall be not higher than 0.55 degrees centigrade below that of pure water. The specific gravity of the total milk solids shall be not higher than 1.35."

Certain conditions operate during the short but difficult period over the late winter and early spring months which all contribute to unsatisfactory tests. It is the purpose of this article to discuss these problems and to suggest possible remedies.

VARIATION IN COMPOSITION.

The seasonal variations in milk composition were examined by the Dairy Research Branch over a period of five years in eight herds on farms which produced milk for the Brisbane milk trade. It was found that the high incidence of substandard fat content milk during the late winter and early spring months coincided with a decline in most milk constituents—total solids, solids-not-fat, casein and total protein.

The mean composition of milk from different one-breed herds varied according to breed. Total solids varied from 11.8% to as high as 14.2%; fat from 3.5% to 5%; solids-not-fat from 8.3% to 9.2%; total protein from

2.77% to 3.47%; casein from 1.98% to 2.61%; lactose from 4.24% to 4.36%.

Including mixed breeds, the seasonal variation in the composition of milk was considerable. The total solids varied from 11.2% to as high as 15.6%; fat from 2.9% to 6.2%; total protein from 2.54% to 4.0%; casein from 1.75% to 3.07%; lactose from 3.78% to 4.63%; solids-not-fat from 8.3% to 9.4%.

The general trend of the seasonal variation in milk composition was similar irrespective of the herd or breed under consideration. The trends in fat, total solids, solids-not-fat, casein and total protein were similar. All tended to be lowest during the usually dry late winter and early spring months. The percentage of fat and total solids showed the widest variation; total protein and casein varied less widely. Lactose varied least of the constituents determined. It did not vary directly with the fat, but the tendency was for higher lactose percentages to accompany lower percentages of fat.

The results showed that milk composition deteriorated sharply following the onset of dry and cold weather, usually in early July. This was seemingly related to the poor condition of the pastures. The hand-feeding of concentrates largely practised at this time of the year increased the milk yield, but was without effect on the constituents of milk.

The seasonal decline in the fat content of milk is not confined only to market milk suppliers, but is also evident from data obtained from herd recording units throughout Queensland.

The cheese-yielding capacity of milk received at Queensland cheese factories also shows similar seasonal variation.

WHY VARIATIONS OCCUR.

Effect of Milking Interval.

Of the main milk constituents, fat is the most affected by the milking interval. The morning milk is consistently lower in fat percentage following the longer overnight interval between milkings.

In commercial practice this disparity in the fat content is of considerable importance, as the liquid milk market is very largely supplied by morning's milk alone. The normal seasonal decline in the fat percentage of milk aggravates the already lower fat content of morning's milk resulting from the longer overnight milking interval.

Many suppliers producing milk for the Brisbane market milk at intervals of 15 hours and 9 hours in the July to October period and quite a number have been known to milk at intervals of 16 hours and 8 hours.

The results of tests carried out which show the effect of the milking interval on the fat content of milk are shown in Table 1.

TABLE 1.

EFFECT OF MILKING INTERVAL OF BUTTERFAT CONTENT.

—	Bulk Milk.	Average Milking Interval (hours.)	Average Butterfat. (Per cent.)
Herd 1	Morning	15½	3·4
	Afternoon	8½	4·6
Herd 2	Morning	13	4·1
	Afternoon	11	4·2
Herd 3	Morning	15	3·1
	Afternoon	9	4·0
Herd 4	Morning	13	4·9
	Afternoon	11	5·4

It is evident from the above figures that the more even the milking interval, the more uniform is the fat percentage. To assist in producing milk which complies with standards, milking times should be regulated to intervals of not more than 13 hours

between the evening and morning milkings and not less than 11 hours between the morning and evening milkings. Cows never become accustomed to very uneven intervals between milkings, and earlier drying-off with a consequent effect on production may result.

Effect of Feeding.

In the past, it had been thought that the foods eaten by the cow exert little influence on the compositional quality of her milk. In recent years, however, it has been shown that under certain conditions food does bring about changes in both the fat and solids-not-fat content of milk. It already seems clear that underfeeding of cows in winter may be responsible for a low solids-not-fat percentage in the milk and that early grass may be a good corrective. There is also evidence that rations which contain high quantities of concentrated foods and limited roughage, such as pasture, fodder crops and hay or silage, will induce a low fat percentage in the cow's milk. Under such conditions a great number of cows do not receive either sufficient bulk or sufficient nutrients for the digestive system to operate normally. The feeding of long roughage is preferred to finely chaffed roughage (normally practised) because of the delayed passage through the rumen of the cow which allows a more complete fermentation of the cellulose for the synthesis of milk fat.

The fat percentage can also be influenced by the feeding of the dry cow or what is usually called "steaming-up." If cows calve in good fleshy condition, they will yield more milk of a higher fat percentage than if they calve in a poor condition. It is undoubtedly a sound practice to "steam-up" dairy cows. This can be effectively achieved by the feeding of concentrates, an adequate proportion of essential minerals, and an ample supply of roughage in the form of long hay or silage.

Studies on a number of farms have shown an apparent deficiency of good quality long roughage for feeding to dairy cattle. Where long roughage is available it is usually most unpalatable and seldom eaten by dairy stock. When chaffed and fed with concentrates, as is usually practised, some increase in milk yields occurred, but the fat percentage was generally low.

By feeding up to 7 lb. of good quality long oaten hay per cow per day to carefully paired groups of cows, it was possible to increase the fat percentage and to some extent the overall milk and butterfat yield of the experimentally fed animals as compared with the controls. By maintaining a milk interval of up to 15 hours between the night and the morning milking, the fat percentage of the morning milk supply from experimentally fed cows was increased by as much as 0.4% butterfat test. Mean values of the fat content of the morning milk were as shown in Table 1.

TABLE 2.

EFFECT OF FEED ON FAT PERCENTAGE.

Farm.	Group.	Mean Fat Percentage in Morning Milk.	
		1953.	1954.
A.	Experimentally Fed	3·3	3·5
	Control	3·1	3·1
B.	Experimentally Fed	3·4	3·3
	Control	3·2	3·2
C.	Experimentally Fed	..	3·7
	Control	..	3·4

Figs. 1, 2, and 3 also show a consistently higher fat content in the experimentally fed group of cows.

For a more uniform milk production and improvement in compositional quality there thus appears to be a need for the feeding of *more conserved long hay* to dairy stock.

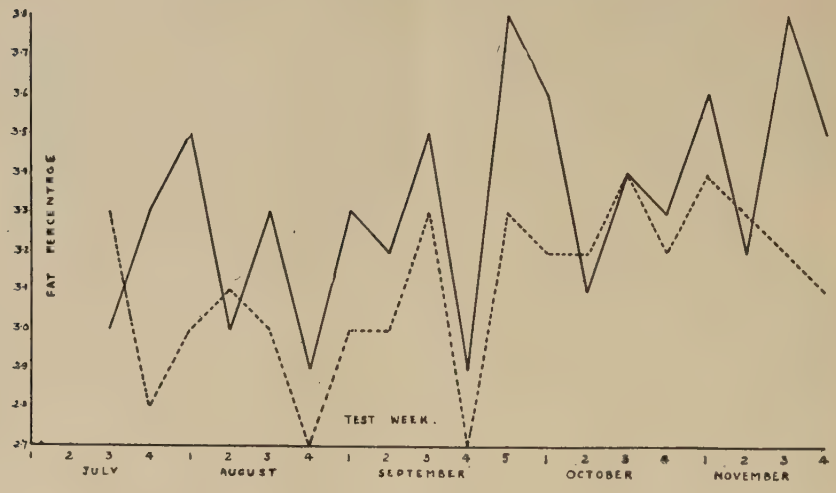


Fig. 1.

Graph Showing the Effect of Feeding Long Sudan Grass Hay on the Butterfat in Milk. The unbroken line is for cows fed the hay; the broken line is for cows that were not fed long hay. The feeding of long hay ceased on October 28.

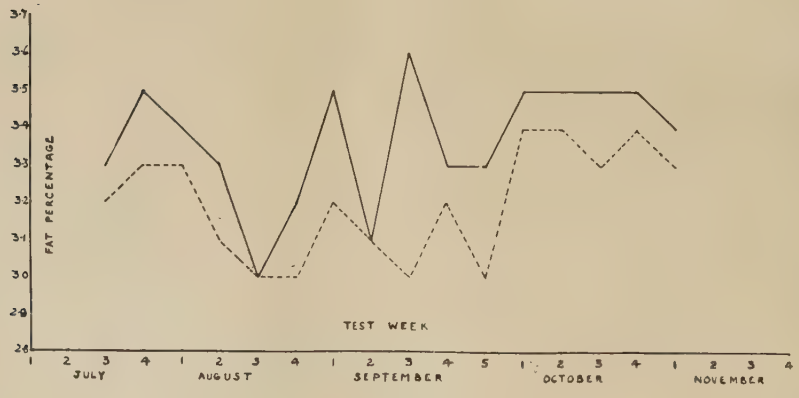


Fig. 2.

Results of a Second Feeding Trial with Long Sudan Grass Hay. The unbroken line is for cows fed the hay; the broken line is for cows that were not fed long hay. Hay feeding ceased on October 2.

Condition of Stock.

Following a usually dry winter with a number of spring calvings in many herds, the majority of cows are not in good condition during the late winter and early spring months. Fat tests of milk from cows in such a condition are generally lower than normal. Provision of an ample supply of good quality home-grown roughage, such as hay and silage, becomes a "must" on all dairy farms, not only as insurance against constantly recurring droughts, but also to avoid decline in the condition of stock with consequent loss in seasonal production and compositional quality of milk.

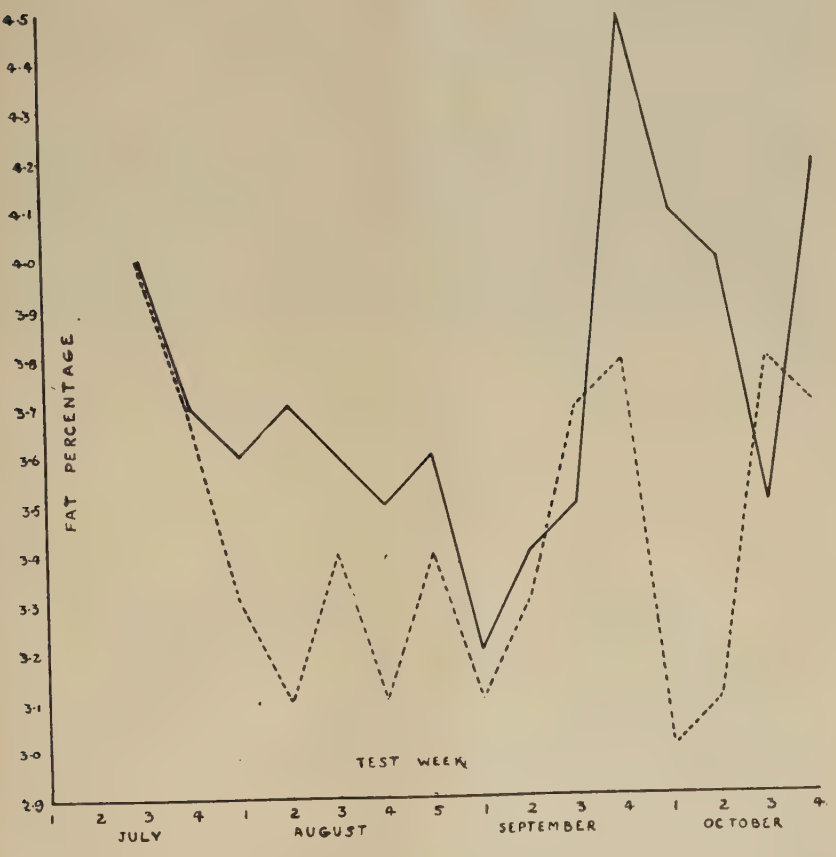


Fig. 3.

Results of a Feeding Trial Using Long Grass Hay. The hay-fed cows are represented by the unbroken line; the broken line is for cows not fed hay. Hay feeding ceased October 2.

Low-Testing Cows.

Many milk producers favour quantity above all else, and so in a great many herds there exists a considerable number of low-testing animals. The breeding of cows which consistently produce milk of low compositional quality should be guarded against. On the basis of herd-recording data, low-testing animals should be culled and a higher fat producing strain of dairy cow included. The inclusion of a bull in the dairy herd whose progeny is of a higher butterfat percentage will also prove well worthwhile.

Some farmers also feed concentrates in considerable quantities with the object of increasing milk yields without appreciating the importance and value of hay in the ration.

SUMMARY AND CONCLUSIONS.

The butterfat test of milk received at milk pasteurising factories shows a seasonal decline, particularly over the late winter and early spring months.

The milk supplied from the morning milking is especially affected and is aggravated by a normally dry winter.

To help producers to maintain a reasonably high test or one at least above the legal minimum of 3.3% over this period, the following practices are recommended:—

(1) Regulate the milking times to intervals of not more than 13 hours between the evening and morning milkings and not less than 11 hours between the morning and evening milkings.

(2) Feed cows hay or other roughage at the rate of not less than 7 lb. per day per cow. Chaffing is not necessary. Better results will be obtained if the hay is fed long.

(3) Milk the heaviest yielding cows last at night and first in the morning.

(4) Keep the cows in good condition. If the pastures are not productive enough to permit full feeding, feed concentrates to supplement them in conjunction with the hay as recommended above.

USE CERTIFIED SEED FOR BEST RESULTS.

The use of high-class seed is one of the keys to success in producing profitable crops. The increasing demand for certified seed indicates that this is well known to many Queensland farmers. The development and expansion of the seed certification scheme, which is being carried out by the Department of Agriculture and Stock, has provided a ready means of securing dependable seed of Queensland's main summer grain and grazing crops.

Mr. W. J. S. Sloan, Director of Agriculture in the Department, stresses the importance of using only certified seed. Use of certified seed makes it possible to secure heavier yields of higher quality, minimises the risk of introducing weeds and diseases, and ensures good stands of crops.

Certified seed is true, clean seed. Its germination is guaranteed and it is true-to-type and true-to-label. It is produced under the close supervision of Seed Certification Committees and seed certification field officers of the Department of Agriculture and Stock. The principal crops for which certified seed is produced are hybrid maize, grain sorghum, fodder sorghum, Sudan grass and cowpea. Certified seed may be purchased from the seed producers themselves or from commercial seedmen. It is not marketed by the Department.

Seed is not certified unless it reaches a high standard. The mother seed, which is the foundation stock for certified seed, is produced by close collaboration between officers of the Plant Breeding Section and of Regional Experiment Stations; in the case of a hybrid maize, officers of the Agricultural College, Gatton, co-operate.

Certified seed may be distinguished by the label and lead seal of the Government Certification Scheme. It should only be sold in sound, unopened bags. This is the only certified seed.

A Simple Grab Gambrel For Hoisting Calves for Ventral Spaying.

By P. ROUND, Senior Adviser in Cattle Husbandry.

When hoisting the hindquarters of calves for ventral spaying, difficulty is sometimes experienced and time lost in securing ropes on the hind legs.

The gambrel illustrated in Plates 1-3 is placed across the hind legs, ring down, just above the hocks. The chains are carried around the lower thigh, and tightly secured in the slot or grab at ends of the gambrel, thus expediting the work. The hindquarters can then be raised on any suitable available hoist. Where calves are caught in a crush it is usual to have the hoist over the crush and hence no arduous man-handling is required.

Materials Required:

One piece flat mild steel 1 in. x ¼ in. —1 ft. 6 in. long.

Two pieces ¼ in. short link chain—each piece is 1 ft. 4 in. long.

One ring 1½ in. diameter, ⅜ in. iron.

The slots in the ends of the gambrel are cut with an oxy-torch and should be 1 in. long by ¼ in. wide. The chains and ring are spot welded on to the bar.

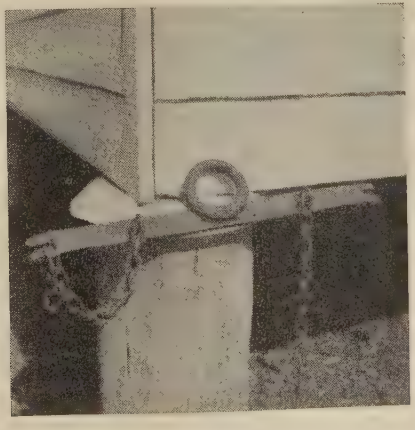


Plate 1.

Photograph of Gambrel.

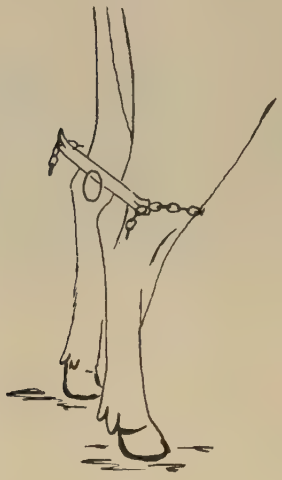


Plate 2.

Gambrel in Position on Calf.

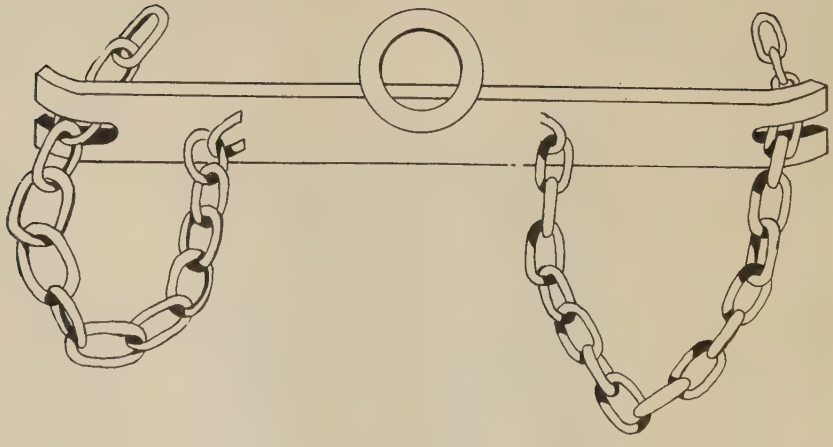


Plate 3.

Sketch of Gambrel.

Breeds of Pigs.

By F. BOSTOCK, Officer in Charge, Pig Branch.

(*Continued from page 247 of the October issue.*)

THE TAMWORTH.

The introduction of the Tamworth breed into Australia dates back to the end of the last century, and there has been a considerable improvement in type and conformation since those days. However, it has always been essential to discard the short-bodied thick-set type, since the longer-bodied, more fleshy type is necessary to maintain true Tamworth quality and fleshiness.

The golden red colour of the Tamworth pig is evidence of its descent from the old English breed, while its peculiar properties show that in purity of breeding it is second to none. The earliest records show Tamworths to have been very active and of great fecundity; their fame as producers of lean bacon is historical. Of all the improved breeds, the Tamworth existed longer in its natural state, depending chiefly on itself for its food, and it is probably to this that is due its persistence of type.

The Tamworth is one of England's oldest purebreds, and developed without the admixture of foreign blood, has justified its distinction as a breed eminently suitable for crossing when the object is to secure more quality, greater length of side, fine bone and a higher percentage of lean meat, as evidenced by the popularity of the Tamworth x Berkshire cross.

Tamworths possess robust constitutions, especially under open-air conditions and paddock feeding, being by nature grazing animals. They are hardy and prolific breeders, the sows being good sucklers and docile with their young.

Standard of Excellence.

Colour, Skin and Hair.

Colour.—Golden red, free from black hairs and spots.

Skin.—Flesh-coloured, fine and free from wrinkles.

Hair.—Straight, fine, abundant and free from curls and roses.

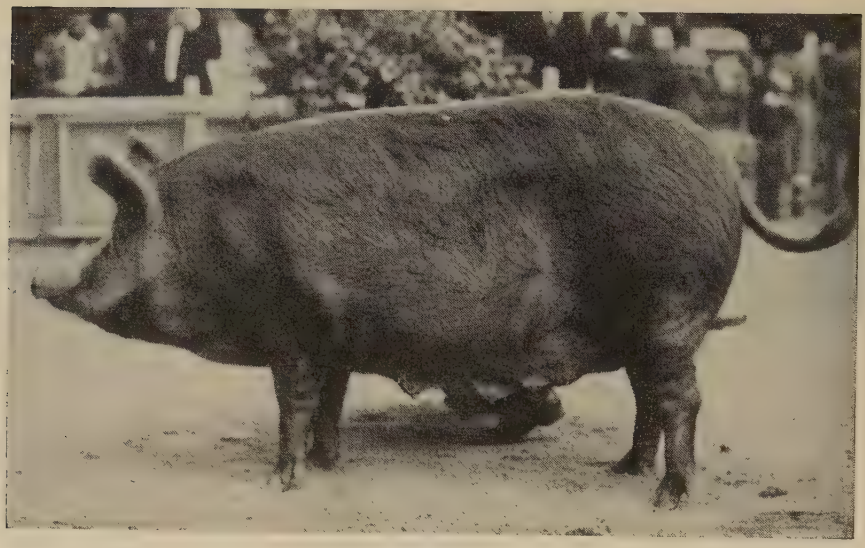


Plate 5.
Tamworth Sow.

Head.

Head.—Moderately long, snout moderately long and straight, face slightly dished, wide between eyes and between ears.

Ears.—Rather large, fine, carried rigid and inclined slightly forward, fringed with fine hair.

Jowl.—Light.

Neck and Shoulders.

Neck.—Medium length, fine, and evenly set on shoulders.

Chest.—Wide and deep.

Shoulders.—Fine, free from coarseness, in alignment with sides as seen from the front.

Back and Sides.

Back.—Long, slightly arched and wide from neck to rump.

Loin.—Full and broad.

Ribs.—Well sprung.

Sides.—Long, level, deep and well let down to flank.

Belly.

Belly.—Underline straight, with 10 or more sound teats, evenly placed and starting well forward.

Hams.

Rump.—Wide and well-shaped back to tail setting.

Hams.—Broad, full and deep to hocks.

Tail.—Set high, long but not coarse, with tassel of fine hair.

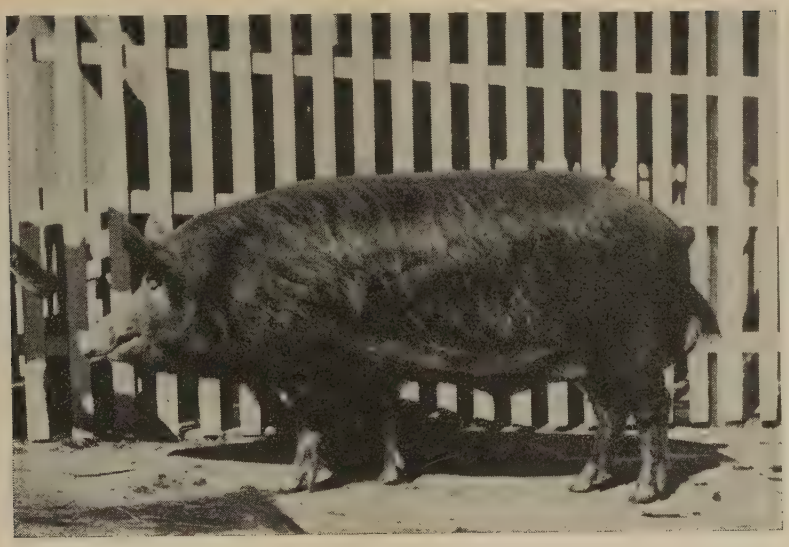


Plate 6.
Tamworth Boar.

Legs and Feet.

Legs.—Straight, set wide apart, level with outside of body, flat and fine in bone.

Pasterns.—Strong and as straight as possible.

Feet.—Strong and neat.

General Appearance.

Character.—A combination of all points, showing distinction in breeding, type and quality. In action, walk to be firm and free.

THE WESSEX SADDLEBACK.

In tracing the early history of the Wessex Saddleback it appears that this breed was originally known as the Old English Forest Pig and had its origin in Dorsetshire or more correctly the Isle of Purbeck. There was no breed standard or herd books, and it says much for the purity of the strain that its type was preserved. Everywhere it earned a reputation as a grazing pig that could be finished at any age for killing, and it was its profit-earning qualities more than anything else that kept it a distinct breed and saved it from being crossed out of existence as many other local types have been.

The danger of the complete disappearance of the breed was realised and the Wessex Saddleback Pig Society was formed with 60 members at Salisbury in 1918 to preserve and improve the breed.

The Wessex Saddleback of today is classed as a dual-purpose pig and produces good type porkers; at the same time, the fact that Wessex Saddleback bacon was awarded reserve for the Whitley Cup at the 1924 London Dairy Show affords proof of the suitability of the breed to produce baconers.

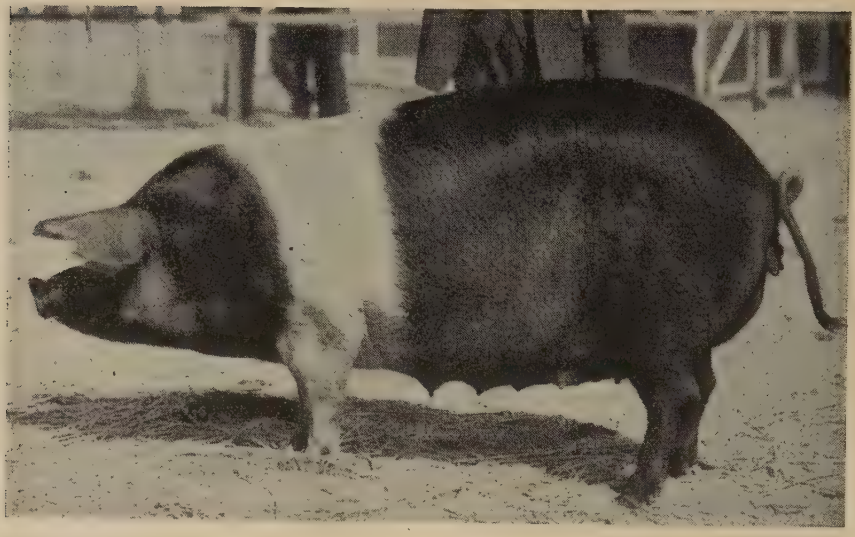


Plate 7.
Wessex Saddleback Sow.

The pig is well known in England to be a good grazer and forager and of hardy constitution. The sows are prolific and have proved to be good mothers, caring for their young well and producing a good flow of milk.

Under local conditions, the breed having adjusted itself to climatic conditions exceptionally well is giving satisfactory results when mated with Tamworths and Large White pigs.

Standard of Excellence.

Colour, Skin and Hair.

Colour.—Black, except for a continuous belt of white over the forelegs and shoulders.

Skin.—Fine and free from wrinkles.

Hair.—Fine, abundant, and free from curls and roses.

Head.

Head.—Moderately long, face very slightly dished, wide between eyes and between ears.

Ears.—Medium sized, with forward pitch, setting well on to face but not obscuring view, furnished with plenty of fine hair.

Jowl.—Light.

Neck and Shoulders.

Neck.—Moderately long, fine, evenly set on shoulders and deep to chest.

Chest.—Wide and deep.

Shoulders.—Fine, free from coarseness, in alignment with sides as seen from the front.

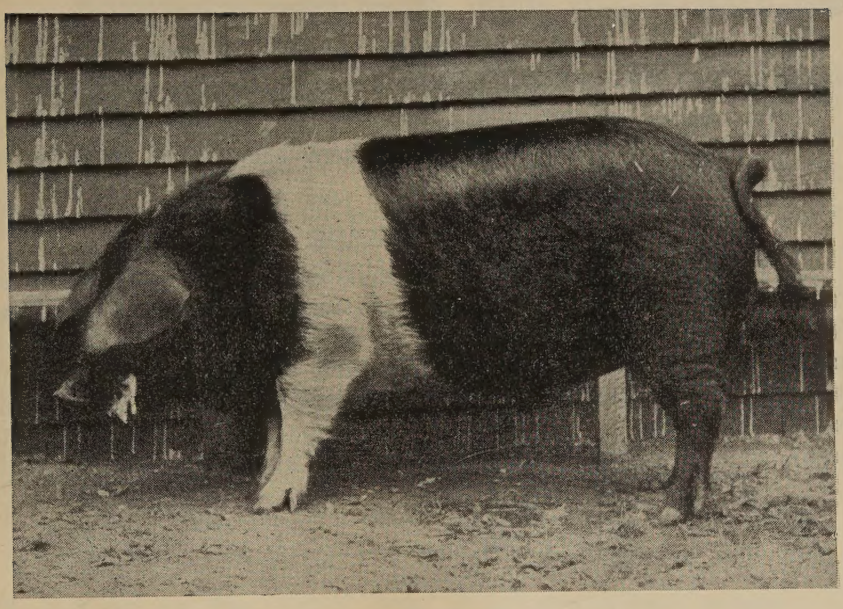


Plate 8.
Wessex Saddleback Boar.

Back and Sides.

Back.—Long, level, and even from neck to rump.

Loin.—Full and broad.

Ribs.—Well sprung.

Sides.—Long, deep and well let down to flank.

Belly.

Belly.—Underline straight, with 6 or more evenly spaced teats starting well forward on each side.

Hams.

Rump.—Wide and well-shaped back to tail setting.

Hams.—Broad, full and deep to hocks.

Tail.—Set high, stout and long but not coarse, with tassel of fine hair.

Legs and Feet.

Legs.—Straight, set wide apart, level with outside of body, flat and fine in bone.

Pasterns.—Strong and as straight as possible.

Feet.—Strong and neat.

General Appearance.

Character.—A combination of all points, showing distinction in breeding, type, and quality. In action, walk to be firm and free.

Note.—Boars should be masculine in appearance, with testicles evenly and well attached. Sows should be feminine in appearance.

OTHER BREEDS.

A number of other breeds of pigs have been used in Australia at varying periods—Poland China, Duroc Jersey, Chester White from America, the Gloucestershire Old Spot and Large Black from England, and, many years ago, the Lincolnshire Curly Coated Pig—but none of these compare favourably with the approved breeds; hence the concentration on the policy of fewer and better breeds and types within the breed, which is giving a wide measure of satisfaction.

SOFT OR OILY PORK.

Reports from bacon factories and meatworks indicate that a condition known as "soft pork" is becoming a grave problem in the pig industry. In soft pork, the fat will not harden when placed in the chilling room. These carcases are unsuitable for bacon manufacture, and as pork they are objectionable to the consumer.

Mr. F. Bostock, Officer-in-Charge of the Pig Branch in the Department of Agriculture and Stock, explains that the condition is caused by feeding excessive amounts of certain foods, especially peanuts. Prevalence of soft pork will undoubtedly influence the price offered for pigs marketed from areas where the condition is known to exist.

By handling them alive, it is impossible to determine whether or not pigs will yield soft carcases. At body temperature, all pig fat is soft, even in pigs that produce firm carcases.

If the farm economy makes it desirable to feed peanuts, the production of soft pork can be avoided if limited quantities are fed, and then only to young pigs. As is well known, pigs in the growing stage store a much smaller amount of fat than they do in the finishing stage. When pigs are being topped off, therefore, they should be given food that will produce a carcase with firm fat.

The first point to observe in feeding peanuts is to give them only to brood sows and young pigs up to certain weights. Investigations have shown that to produce firm carcases, pigs cannot be fed more than 90 to 100 lb. per head of peanuts (on a shelled basis). With pigs intended for slaughter, peanut feeding should start not later than 60 lb. live weight, and after 100 lb. of peanuts per pig have been fed, the animals should be finished on a well-balanced grain ration.

Maize and oats have more fat than other grains and have a tendency to produce soft fat if fed in excess. However, where these grains are used with protein supplements in a well-balanced ration there will be little or no risk of producing soft pork.

Brucellosis-Tested Swine Herds (As at 31st October, 1955).

Berkshire.

A. P. and N. Beatty, "Deepdene," Barambah road, Nanango
S. Cochrane, "Stanroy" Stud, Felton
G. Handley, "Handleigh" Stud, Murphy's Creek
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
M. K. Collins, "Kennington" Stud, Underwood road, Eight Mile Plains
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
J. H. N. Stoodley, "Stoodville," Ormiston
H.M. State Farm, Numinbah
N. F. Cooper, Maidenwell
R. H. Coller, Tallegalla, *via* Rosewood
E. J. Clarke, "Kaloon" Stud, Templin
M. G. and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
W. F. Ruhle, "Felbrie" Stud, Kalbar
L. Puschmann, "Tayfeld" Stud, Taylor
Dr. B. J. Butcher and A. J. Parnwell, "Hartley Grange" Stud, 684 Logan Road, Greenslopes
C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. McLennan, "Murcott" Stud, Willowvale
H. M. Wyatte, "Deepwater" Stud, Rocky Creek, Yarraman
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
R. J. Webber, "Webberberry" Stud, 35 Caxton st., Petrie Terrace
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud. M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
The Marsden Home for Boys, Kallangur
M. F. Caliaghan, Lower Mount Walker, via Rosewood
J. B. Lotz, M.S. 794, Kalbar
G. J. Hutton, Woodford
E. R. Kimber, Coalstoun Lakes
K. B. Jones, "Cefn" Stud, Pilton
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
L. Pick, Mulgeldie
J. W. Bukowski, "Secreto" Stud, Oxley

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
K. B. Jones, "Cefn" Stud, Pilton
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
K. A. Hancock, "Laurestonvale" Stud, Murgon
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
G. J. Hutton, Woodford
H. L. Larsen, "Oakway," Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. I. Skyring, "Bellwood" Stud, *via* Pomona
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
F. K. Wright, Narangba, N. C. Line
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
Kruger and Sons, "Greyhurst," Goombungee
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri

Tamworth.

S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
A. J. Surman, "Namrus" Stud, Noble road, Goodna
Department of Agriculture and Stock, Regional Experiment Station, Kairi
E. C. Phillips, "Sunny View," M.S. 90, Kingaroy
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
L. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
H.M. State Farm, Numinbah
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. H. Sattler, Landsborough
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
Q.A.H.S. and College, Lawes
R. H. Coller, Tallegalla, *via* Rosewood
A. J. Potter, "Woodlands," Inglewood
P. V. Campbell, "Lawn Hill," Lamington

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
J. Gleeson, "Iona Vale" Stud, Kuraby
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trout road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
F. K. Wright, Narangba, N. C. Line
R. A. Collings, "Rutholme" Stud, Waterford
W. R. Dean, "Trelawn," Tandur, *via* Gympie
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
Mrs. R. A. Melville, "Wattledale Stud," Beenleigh road, Sunnybank
A. J. Stewart, "Springbrook," Pie Creek road, Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur
A. J. Hicks, M.S. 98, Darlington, *via* Beaudesert
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead Stud," Grantham

British Large Black.

H. W. Naumann, "Parkdale" Stud, Kalbar

PIG INDUSTRY LOOKS TO HOME MARKETS.

The financial security and expansion of the pig industry hinge on its ability to win back home markets lost during the last 15 years.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said the annual overall consumption of pig meats in Queensland is 6 lb. a head below the 1936-39 average. Queensland now supplies 384,000 pigs for slaughter each year, but if there is a return to the 1936-39 average consumption an additional 144,000 will be required.

Whether pre-war consumption of 10.4 lb. of pork and 10.2 lb. of bacon and ham per head per year can again be achieved rests largely with pig-raisers themselves. Any increase in consumption will depend on producers sending only prime quality pigs to slaughter.

By turning off only prime grade pigs, it will be possible to place before consumers an attractive commodity of the right quality. In this, the housewife is the final judge, and no headway will be made by trying to sell poor quality or overfat pork, bacon or ham.

The refusal of customers to buy overfat pig meats was probably the main contributing factor to the drop in pig prices last year. The falling off in quality was countered by introducing a voluntary grading system with premium payments for good quality pigs. Within a year 80 per cent. of the pigs marketed were prime grade.

Mr. Collins warned producers that there is a grave danger of the voluntary grading system breaking down when production is low. Producers should remember, however, that as soon as the supply again outstrips the demand, prices for overfat pigs will slump. Farmers who have not taken steps to produce pigs that can satisfy the present grading standards will then find it almost impossible to sell their pigs, even at a reduced price.

RANDOM SAMPLE EGG PRODUCTION TRIAL.

The hatching stage of the 1955 random sample poultry production trial reveals a range of 13 per cent. in the hatchability of the nine groups of eggs set.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently that the top group secured an 82 per cent. hatch, while in the bottom group 69 per cent. of the eggs hatched. As all eggs set are not fertile, a hatch of 82 per cent. can be regarded as first-class.

Hatchability is influenced by the nutrition of the parent birds, incubator management and certain hereditary factors in the parent stock. In commercial poultry flocks officers of the Department have found a great deal of low hatchability to be due to incorrect feeding of the breeders.

Results of the hatching stage of the 1955 trial suggest that entrants should first assure themselves that an adequate ration is supplied to their breeders. Low hatchability, if it persisted, would then be narrowed down to a breeding problem.

Improvement in egg production of the State's poultry flocks is expected to be the ultimate result of the random sample production trials. The trials will reveal high-producing strains of fowls and point out any faults that lower efficiency of production. It is expected that birds from flocks of revealed highly productive strains will be sought by commercial egg producers to improve the quality of their flocks.

Producers will have an accurate picture of the productive capacity of the chickens they buy, and, at the same time, hatcherymen will be able to see where their strains lag behind others. Faults that may be shown up by the trials are poor hatching, loss of chickens during the rearing period, low egg production and the failure of birds to live through the first laying year.

In these trials, eggs drawn at random from those about to be set by hatcherymen are hatched in the same incubator at the Department's Animal Husbandry Research Farm (Rocklea). The chickens are also reared by the Department. All birds taking part in the trial are given similar conditions of feeding, management and accommodation from hatching until the end of the first laying year. Points are allotted for hatchability and as the trial progresses for rearability, production and livability.